AMerican Machinist

McGRAW-HILL, INC. 330 WEST 42nd STREET, NEW YORK, N.Y. 10036

CONTENTS OF VOLUME 110 JANUARY TO DECEMBER, 1966

A

Abrasives
Abrasive machining in focus. J.E. Haggett (chart) — Aug. 29 70
Disk wheel has cement-bonded abrasive plugs (MR) — Oct. 24 3

Adapters – Multiple size adapter for slotting saw work. A.T. Pippi (PI) — June 6 152

Adhesives
Adhesive bond may equal weld strength (MR) — July 18 3
Adhesive holds ceramic cutting edge on drill bit (MR) — Feb. 14 3
Adhesives from U.S. Steel (T) — Nov. 7 49
Diffusion bonding beats brazing or arc welding (MR) — Oct. 10 4
Electrolytic etch prepares stainless for adhesive bond (MR) — Sept. 26 4
Five single-part adhesives for metal parts (MR) — June 6 4
Hot presses bond skin to helicopter blades — Apr. 25 100
Nickel bond joins layers of refractories (MR) — Feb. 28 4
Nickel coat is simply bonded to steel sheet (MR) — Nov. 7 3
Polyimide bond improves diamond grinding wheel (MR) — Oct. 10 3
Rubber cement in tubes. A.T. Pippi (PI). — Sept. 12 147
Ultrasonics aids in testing of adhesive bonds (MR) — Oct. 24 4

Aerospace Manufacturing
Aerospace employment to rise (T) — Apr. 11 43
Already, a step beyond adaptive controls? Aerospace manufacturers want to add process control to the working of exotic materials — Oct. 24 121
Apollo Command Module – NC retrofit speeds production — Apr. 11 131
Bell Helicopter's 'diagramatic planning': helicopters in a hurry. Marvin Reid — Dec. 19 94
Bell Helicopter keeps pace with demand. 'Copters – rush! Marvin Reid — Feb. 14 80
Bendix's facility at Cape Kennedy – job shop for NASA space vehicles — Feb. 14 82
Boeing 737 short-range jetliner takes shape — Aug. 15 171
Boeing teams up adaptive control and numerical control A.M. Sciaky — Dec. 19 85
Boeing Vertol Div.'s hot presses bond skin to helicopter blades — Apr. 25 100
Electron beam welds 5-in.-thick stainless — Feb. 14 179
Future machine tool needs studied (T) — May 23 39
Gas tungsten-arc welding being done on continuous-path NC machine. Stoeckinger & Littlefield — Aug. 1 95
Gemini capsule section is held in a spot-welding fixture that floats on a film of air (cover) — May 9 1
Gemini heat shield manufacture – an 'impossible' diamond tool — June 20 120
Gemini spacecraft – fingertips move weld fixtures at McDonnell Aircraft. Dubusker & Robertson — May 9 97
GE's Missile & Space Div.'s non-destructive tests for weld flaws — Feb. 28 80
Kaman Aircraft – twisting (rather than machining) Helix angles into rotor spars of helicopters. Art Zimmerman — Jan. 3 60
Lockheed-Georgia's giant C-5A jet transport – tighter tolerance for chemical milling — Dec. 19 89
Lockheed-Georgia's NC is management's baby. James Sandford — Sept. 26 106
Lockheed-Georgia shop laser checks NC positioning accuracy. James Sandford — Nov. 21 118
Lockheed Missiles & Space Co. – building batteries for space. W.J.Conner — Mar. 14 121
Machining SS to tight tolerances — Feb. 28 75
1965: a record year (T) — Feb. 14 29
Northrop Corp. – molding a 10-foot plastic ball – Air Force's new space flight simulator. A.M. Guerreiro — Mar. 14 128
NC for stretch dies hold closer tolerances for aircraft sheet metal parts. Max Lofton — Aug. 15 108
NC horizontal boring mill machines aerospace components weighing as much as 10 tons (cover) — Feb. 14 1
Picatinny Arsenal 'silent room' – Drilling by ear. Joseph Kuletz — July 4 63
Pratt & Whitney's jet engine cases – faster way to contour mill. Rupert Le Grand — Mar. 28 72
Progress in roll extrusion (T) — July 18 33
Rx for chip contamination in aircraft heat exchangers — Mar. 14 131
Saturn rocket booster – milling boosts lunar payload. Nansen & Albert — Feb. 28 71
Saturn rocket booster – sculptured pockets are milled in a 33-ft-OD aluminum ring (cover) — Feb. 28 1
Titanium aircraft wheels (T) — June 6 33
Tools rebuilt to space specs — Dec. 19 92
Welding a tilted contour for the Shillelagh bulkhead assembly. George Merrick & others (tables) — Aug. 1 100

Air Compressors (see **Compressed Air**)

Air conditioning – K&T air-conditions its whole plant — July 18 110

Aircraft (see **Aerospace**)

Aluminum
Aluminum powder sheet on the way (T) — June 6 41
Anodizing method produces design in color on aluminum (MR) — July 18 4
British machine automates low-pressure casting (MR) — Dec. 5 3
Copper plated by phosphate anodizing (MR) — June 6 4
Disk-type cutters are best for shaped honeycomb (MR) — May 9 4
Draft for aluminum castings (Ref. Bk. Sheet) — June 20 151
Drawing thick aluminum shell. M.J. Golostein — Dec. 5 136
Electroplating chromium directly onto aluminum (T) — Feb. 14 19
First Tig, then Mig–now it's Pig welding (MR) — July 18 4
Flying die speeds roll forming. George DeGroat — Feb. 28 78
HERF bangs out long extrusions for Snakeye bomb retarders — July 18 115
Metallic whiskers are growing longer, stronger (MR) — Aug. 1 4
Navy's Mark 16 torpedo – How to 'butter up' a weld — Aug. 1 98
New methods for welding two-ton aluminum rings (MR) — Jan. 31 4
1966 outlook – aluminum sets fast pace in nonferrous metals (chart) (report) — Jan. 17 101
Odd jobs for screw machines — Dec. 19 87
Oil cools drills at 750 psi in drilling aluminum head housings. H.C. Lindberg — Apr. 25 101
Portable aluminum 'sandwiches' take aircraft landings (MR) — Aug. 15 4
Radiant-heater system works for brazing aluminum (MR) — Apr. 25 4
Recessing tool cuts job time 75% — Aug. 15 118
Rx for chip contamination – castable compound seals openings — Mar. 14 131
Saturn rocket booster – milling boosts lunar payload. Nansen & Albert — Feb. 28 71
300 cans a minute! Rupert Le Grand — June 20 126
Tolerances for aluminum castings (Ref. Bk. Sheet) — June 20 149
Transfer lines get 'tight' – machining complex parts for anti-smog device — Jan. 3 66
Two quartets of spindles guided by tape (MR) — Mar. 28 3
Wing bending methods. E.P. Schneider (Ref. Bk. Sheets) — June 6 143

American Iron and Steel Institute
Forging today. F.E. Chepko (report) (chart) — Nov.21-121-136
Precoated steel. C.M. Parker (report) (chart) — Sept.12-129-136

American Machinist Reports (see **Special Reports**)

American Society for Metals – Westec show – NC again in the spotlight — Mar. 28 76

American Society of Mechanical Engineers – ASME winter meeting highlights — Dec. 19 91

American Society of Tool & Manufacturing Engineers
1966 Tool Show
List of exhibitors — Apr. 11-155-160
Technical program — Apr. 11 161
Tool Show in print — Apr. 11 162
1966 Tool Show report — May 9 104
Westec show – NC again in the spotlight — Mar. 28 76

American Welding Society
Meeting unveils new development – the case for the tailored arc — May 9 101
Previews of fall meeting (MR) — Sept. 26 4

Anodizing
Aluminum is copper plated by phosphate anodizing (MR) — June 6 4
Anodizing method produces design in color on aluminum (MR) — July 18 4
Cleaning and anodizing tube interior (MR) — Feb. 14 4

Apprentices (see **Training**)

Arbors
Arbor saves setup time. M. Schmidt (PI) — Sept. 12 148
Arbor support beefs up small, vertical mill. R. Riker (PI) — Oct. 10 165
Expanding sleeve stud arbor. R.A. Dressler (PI) — Aug. 29 92

Assembly
Assemble-matic puts together differentials (MR) — Jan. 3 4
Assembly banks pay high dividends (charts) — Sept. 26 121
Assembly of railroad hopper cars has been boosted 50% by modernized methods (cover) — Oct. 10 1
Automatic assembly: its potentials and pitfalls. Charles Emerson (report) — Feb. 28-93-100

(ed) Editorial. (MR) Metalworking Report. (PI) Practical Ideas. (T) Trends.

Automatic ... ed gives stud welder 30-pc/min rate (MR) — May 9 4
Ball bearings are assembled automatically (MR) — Aug. 29 4
Diemakers build machines too. Rupert Le Grand — July 4 70
Fastening system automatically feeds and drives screws (MR) — May 9 4
Going to mechanized soldering and brazing? George Williams (table) — Aug. 1 89
Grooved tubes are joined by spiral wire (MR) — June 20 4
Hollow spherical rotors assembled by electroplating (MR) — Sept. 26 3
Magnetic belts handle long, thin core laminations (MR) — Dec. 19 4
1966 outlook – Technical: assembly (report) — Jan. 17 112
Stud press holds rockers in car engines (MR) — Apr. 25 4
Three machines are tied together for automatic assembly (MR) — Sept. 12 3

Atomic Power

Joining beryllium to stainless for a linear accelerator. W. Kudenov Jr. — Sept. 12 118
Retooling for nuclear power – at GE's LST – G. Harry Mote — Sept. 26 116

Automation

Assembly banks pay high dividends (charts) — Sept. 26 121
Automatic assembly: its potentials and pitfalls. Charles Emerson (report) — Feb. 28-93-100
Automation report details (T) — Feb. 14 25
Ball bearings are assembled automatically (MR) — Aug. 29 4
Blanking line cuts setup time — Mar. 14 124
Fast polish for stainless sheet. James Sandford — July 18 130
Final automation commission report (T) — Jan. 31 29
The push for modernization (tables) — Dec. 5 128
Soldering methods automated with pre-tinned metals (MR) — Feb. 28 3
Three machines are tied together for automatic assembly (MR) — Sept. 12 3

Automobile Manufacturing

Air controls machine tools – Numatrol. Charles Emerson — Dec. 5 139
American Bosch Arma Corp's diesel engine fuel systems plant – one chucker outworks two lathes — Feb. 28 85
Auto dies by computer – AUTOSURF computer program. Jack Star — Nov. 21 112
Chrysler Corporation computer takes on new jobs. Charles Emerson — Jan. 3 55
Chrysler Corp.'s stamping plant – EDM makes it big — June 20 132
Chrysler's turbine car test (T) — Apr. 25 31
Cutters take interrupted cuts in the bore of an aluminum, anti-smog air pump for autos (cover) — Jan. 3 1
Deere, John, Tractor Works' multiple setups speed output. B.C. Brosheer — May 9 111
Earthmoving equipment – how to machine a giant. H.A. Squires — Mar. 14 132
Ford Motor Co. – controls on presses have new safety features — Mar. 28 149
Ford expands forge plant — Feb. 14 86
Ford – NC at Ford. Emerson & Hatschek — Jan. 17 90
GM's advanced remote control for engine block work (MR) — Sept. 12 4
GM's new piston manufacturing line jumps output 50%. J.E. Sandford — Jan. 17 84
GM's Oldsmobile: cast dies for auto forgings. Charles Emerson — Oct. 10 132
GM's Oldsmobile: tooling up the Tornado. Charles Emerson — June 21 123
Germany's Auto-Union, new life for an old automaker. Charles Emerson — Aug. 29 74
Machining the complex part — Sept. 12 107
1. Automating for low volume. B.C. Brosheer — Sept. 12 108
2. Automating for high volume. Charles Emerson — Sept. 12 111
Muffler manufacturer's custom-built, cut-to-length line. Frank Richardson — Jan. 31 69
NC diemaking – the push for NC die milling — Jan. 17 89
NC grinder cuts auto cams. Yasumasa Ishihara — Sept. 26 112
Safety – A time to extend competition (ed) — Apr. 11 121
Safety standards – A pendulum is to swing (ed) — July 4 61
Superior Coach Corp.'s school bus – welding zinc-coated sheet — Mar. 28 70
Three machines are tied together for automatic assembly (MR) — Sept. 12 3
Transfer lines get 'tight' – machining complex parts for anti-smog device — Jan. 3 66
Volkswagen adding new tooling for its larger 1500/1600's. Charles Emerson — July 4 74
VW figures prove out cold forming — July 18 121
World motor vehicle output up again (table) — Mar. 14 134

Awards

AM Award – first AM Award to Charles Patterson — Jan. 3 59
The AM Award: Donald C. Burnham (cover) Dec. 19-1, — Dec. 19 98
A note of thanks – National Magazine Award commendation (ed) — Mar. 28 63

B

Balancing

1966 Tool Show Report — May 9 104
Tolerances for balancing 1 & 2. H.E. Mueller (Ref. Bk. Sheets) (chart) — Feb. 14 99

Bearings

Analytical method predicts bearing fatigue failure (MR) — May 23 3
Ball bearings are assembled automatically (MR) — Aug. 29 4
Bearings add length to undersize tools. R.J. Hill (PI) — July 18 140
Ground glass lubricant assures functioning of bearings above 600 F (MR) — Jan. 3 3
Hollow ball bearings under development (T) — Aug. 29 47
Marquench cuts distortion, costs of bearing rings — Jan. 17 86

Bending

Draw dies are being replaced by tangent bending (MR) — Jan. 31 4
How to bend titanium tubing. R.J. Bozund — Aug. 29 72
Low cost bending die handles short runs. R. Grenon (PI) — May 9 137
NC tube bender is being developed for multi-bends (MR) — July 18 4
Press bends scratch-free parts. J. Waller (PI) — Feb. 14 105
Press-brake bends. M.J. Hess (Ref. Bk. Sheet) — Nov. 7 167
Tonnage chart for various bend angles. R.F. Dehn (Ref. Bk. Sheet) (chart) — Apr. 11 247
Tool bends precise angles. J. Schmidt (PI) — Jan. 17 139
Tool makes four bends in one stroke. C. McLaughlin (PI) — July 4 105
Wing bending methods. E.P. Schneider (Ref. Bk. Sheets) — June 6 143

Beryllium

Alloy for cryogenic jobs (T) — Apr. 25 37
Joining beryllium to stainless for a linear accelerator. W. Kudenov Jr. — Sept. 12 118
Nickel plate beryllium to join it to stainless (MR) — Jan. 31 3

Blanking (see Stamping)

Block, heel – Versatile heel block. E. Jones (PI) — Aug. 1 118

Blocks (see also Dies, V-blocks)

Bolts – Emergency T-slot bolt. A.T. Pippi (PI) — Dec. 19 124

Bonding (see Adhesives)

Book Reviews

Electrofinishing — Oct. 24 260
Fastener Standards (Fourth Edition) — May 9 238
Fundamentals of Dimensional Metrology — Oct. 24 258
Machining Data Handbook — Oct. 24 256
Optical Tooling in Industry — Oct. 24 258
Revolution in the Toolroom — Oct. 24 256
Solders and Soldering — May 9 238
Training Sales Engineers — May 9 242
Welding Handbook, (Fifth Edition) — May 9 242
The Young Machinist's Handbook — May 9 238

Boring

Adjustable boring bar. R. Phillip (PI) — July 4 105
Boring bar made from steel tube. J.A. Waller (PI) — Aug. 1 117
Boring holes near an edge. R. Jagen (PI) — Mar. 28 107
Ceramic tools for cylinder boring (T) — Oct. 10 43
How to machine a giant. H.A. Squires — Mar. 14 132
Job shop for NASA space vehicles — Feb. 14 82
Machining a large spherical bore. J. Waller (PI) — June 20 155
1966 outlook – Technical: cutting (report) — Jan. 17 114
NC horizontal boring mill machines aerospace components weighing as much as 10 tons (cover) — Feb. 14 1
NC retrofit speeds Apollo production — Apr. 11 131
Spring loaded boring tool absorbs cutting shocks. J.A. Waller (PI) — Aug. 29 91

Brakes (see Press Brakes)

Brass

Brass alloys are low melting, can be die cast (MR) — Apr. 25 4
Compound die for heavy work. M.J. Goldstein — May 23 114
New brass alloys are stronger than other brasses (MR) — June 20 3
Wing bending methods. E.P. Schneider (Ref. Bk. Sheets) — June 6 143

Brazil – Manpower around the World. Wes Perry — June 20 142

Brazing

Braze plus solder makes cans — Jan. 17 87
Brazing reduces cost of joining stainless parts (MR) — Aug. 15 4
Going to mechanized soldering and brazing? George Williams (table) — Aug. 1 89
High-speed furnace using infrared for controlled brazing (MR) — Oct. 24 4
How to work the super 12% Cr steels. Briggs & Parker (report) (charts & tables) — Mar. 14-135-150
Nickel-braze method for repair of jet engines (MR) — July 4 4
Nickel plate beryllium to join it to stainless (MR) — Jan. 31 3
Radiant-heater system works for brazing aluminum (MR) — Apr. 25 4

Broaching

Broach geometry (Ref. Bk. Sheet) (table) — Aug. 1 113
Broach is preloaded for accuracy (MR) — Aug. 15 4
Broaching of various materials (Ref. Bk. Sheet) (tables) — Aug. 15 123
Revolving broach and burnishing tool. P. Henning (PI) — Mar. 28 107

Bulging

Bulging dies go glamorous — Jan. 17 77
Bulging with a spring punch. M.J. Goldstein — Mar. 28 77

Burnishing

Dry burnishing machine is fast and inexpensive (MR) — Oct. 24 4
Revolving broach and burnishing tool. P. Hennig (PI) — Mar. 28 107
Simultaneous burnishing of OD and gear-rim ID (MR) — Apr. 25 3

Burring (see Deburring)

Bushings

Extra length improves bushing. E.J. Goulet (PI) — Dec. 5 163
Solid, bronze-type pins and bushings outlast ball-type? (MR) — July 4 3

C

Calipers – Caliper has many uses. H. Koslow (PI) — Nov. 7 174

Cams

Double cam slide boosts punch travel — Dec. 5 138
ECM teams up with NC to solve problem at Xerox — June 20 128
Interchangeable cams increase press speed (MR) — Oct. 10 4
NC grinder cuts auto cams. Yasumasa Ishihara — Sept. 26 112
Optical tracer guides mill for barrel cam (MR) — Feb. 28 3

(ed) Editorial. (MR) Metalworking Report. (PI) Practical Ideas. (T) Trends.

Tooling a fourslide, 9. C.J. Labonack ..... May 9 108
Two-sided wedge adds to cam slide speed, tool use (MR) ..... Dec. 5 3

Capital Investment
Capital is a raw material, too (T) ..... Oct. 24 45
Capital spending pace to slow (chart & tables) ..... Nov. 21 109
Capital spending to rise 19% in 1966 (table) ..... Apr. 25 89
The clearing outlook (ed) ..... Nov. 21 105
Free world economic outlook (T) ..... Jan. 31 43
How to cure a cry-baby (ed) ..... Mar. 14 119
1966 outlook (cover) ..... Jan. 17 1
1966 outlook: fifth straight year of record output (charts & tables) (report) ..... Jan. 17-95-126
Operating ratio study of industry (T) ..... Nov. 21 39
The push for modernization (tables) ..... Dec. 5 128
The test that binds (ed) ..... Feb. 14 71
The unexpected scramble (ed) ..... Dec. 5 123
U.S. corporations expect their pre-tax profits to jump 6% over last year (T) ..... Feb. 28 21

Carbides
Carbide dies stamp parts from 1%-silicon steel (MR) ..... June 6 3
Carbide surfacing improves tool life ..... Mar. 28 83
Carbide-tool breakage. V.G. Yost (Ref. Bk. Sheets) ..... Apr. 25 107
Tandem carbide inserts cut replacement costs. E. Goulet (PI) ..... May 9 138

Cast Iron
GE does it: die-casts ferrous metals ..... May 23 111
Simultaneous burnishing of OD and gear-rim ID (MR) ..... Apr. 25 3
Stellite markets porous metal sheet (T) ..... June 20 41
Transfer lines get 'tight' -- machining complex parts for anti-smog device ..... Jan. 3 66

Casting
Continuous casting gets 2nd boost--new mill for Republic ..... Sept. 12 199
Custom-tailored castings? (T) ..... Apr. 11 51
Draft for aluminum castings (Ref. Bk. Sheet) ..... June 20 151
Perfected methods for casting alloy turbine blades (MR) ..... Mar. 28 3
Radiographic standards for castings (T) ..... Mar. 28 43
Recessing tool cuts job time 75% ..... Aug. 15 118
Tolerances for aluminum castings (Ref. Bk. Sheet) ..... June 20 149
Work rest is located by part being cut. E. Goulet (PI) ..... Apr. 25 115

Casting (see also Die Casting)

Centering
Center drilling is replaced by cold forming (MR) ..... Feb. 14 3
Centering a cutter. H. Koslow (PI) ..... Oct. 10 164
Spring insures centering of telescoping gages. D.F. Kimberling (PI) ..... Dec. 19 123
Spring loaded center saves time. H. Stolle (PI) ..... Jan. 31 85

Ceramics
Adhesive holds ceramic cutting edge on drill bit (MR) ..... Feb. 14 3
Boosting the strength of ceramics (T) ..... July 18 43
Powdered metal and ceramic mixed for reinforcing fiber (MR) ..... Nov. 21 4
Turning with ceramic tools (Ref. Bk. sheet) (table) ..... July 4 99

Chains
Chain stretches tool limit. Erich Dreschler ..... Feb. 14 73
Flexible chain boosts toolchanger storage capacity (MR) ..... Feb. 14 4

Chemical Milling
Chemical milling tackles complex machining jobs (MR) ..... Aug. 15 3
'Electrogel' -- chemical milling 3-D shapes without masking (MR) ..... Mar. 14 4
Etchant produces smooth surface on aluminum alloy (MR) ..... Nov. 7 4
Hard alloys are chemical milled to precise tolerances (MR) ..... Aug. 1 3
Nonhazardous acid etches weld samples (MR) ..... Dec. 5 4
Tighter tolerances for chemical milling for Lockheed-Georgia's giant C-5A jet transport ..... Dec. 19 89

Chicago Show Issue -- 1966 Chicago Metal Show in print ..... Oct. 24 167

China -- Red China aims at Afro-Asian markets -- Hong Kong exhibition. W.K. Jackson ..... Oct. 24 126

Chips
Chipbreaking with either oscillating feed or interrupted feed (MR) ..... Feb. 28 3
Chip development -- ASME meeting ..... Dec. 19 91
Magnet shunts metal flakes. D.F. Kimberling (PI) ..... July 4 105
Rx for chip contamination -- castable compound seals openings ..... Mar. 14 131

Chromium
Chrome-coated strip makes a better tin can (MR) ..... Sept. 12 3
Dual power is key to hard-chrome plating technique. Hans Hausner ..... Apr. 25 102
Electroplating chromium directly onto aluminum (T) ..... Feb. 14 19
Electroplating gives black chrome for auto parts (MR) ..... Dec. 19 4
How black is black chrome? ..... Dec. 19 88
Technique for hard-chrome plate has dual power (MR) ..... Apr. 25 4

Chucks and Chucking
Chuck jaws renewed. A. Katell (PI) ..... Aug. 15 130
Chuck supports tailstock. J. Waller (PI) ..... Mar. 14 159
Fast ways to change work. B.C. Brosheer (report) 3. Standard and special devices for gripping work-pieces for machining ..... Apr. 11-137-152
One chucker outworks two lathes at American Bosch Arma Corp. ..... Feb. 28 85
Tracer unit indexes with chucker turret (MR) ..... May 9 4

Clamps
Clamp block aids work setup. F.L. Rush (PI) ..... June 20 156
Clamping strip anchored in lathe tool-post. H.W. Day (PI) ..... June 6 151
Clamping system combines ship air-oil reservoir (MR) ..... Nov. 21 3
Fast ways to change work. B.C. Brosheer (report) 3. Standard and special devices for gripping work-pieces for machining ..... Apr. 11-137-152
Hydraulic clamping simplified. Harry Mote ..... Dec. 5 135
Set screw increases safety of C-clamp. H. Divaris (PI) ..... Nov. 7 173
Slide strap clamp with steel balls. R. Parmley (PI) ..... June 6 152
Spring clamps hold work in welding fixture. D. Rowland (PI) ..... Apr. 25 116

Cleaning
Automated unit takes on vapor-degreasing jobs (MR) ..... June 20 3
Breakeven for bulk solvents ..... Dec. 5 148
Cleaning and anodizing tube interior (MR) ..... Feb. 14 4
Cleaning tank simplifies work handling. D. Kimberling (PI) ..... Apr. 25 115
Cleaning with ultrasonics. J.E. Sandford (charts & tables) (report) ..... Feb. 14-87-98
How to clean copper parts (Ref. Bk. Sheets) ..... May 23 137
1966 outlook -- Technical: cleaning and finishing (report) ..... Jan. 17 112
'Peen and clean' process employs rotating wheels (MR) ..... Oct. 24 3
Removable type of corrosion preventative (MR) ..... June 6 4
Sand blasting automated on a monorail (MR) ..... May 23 4
System both strips and welds insulated wire (MR) ..... Aug. 29 4
Two-step cleaning performed in one ultrasonic unit (MR) ..... Jan. 3 4

Coatings
A bright acid plating system for tin (MR) ..... July 4 4
Carbide surfacing improves tool life ..... Mar. 28 83
Diamond grinding today. J.J. Dwyer Jr. ..... Oct. 24 122
Diamond grit is metal clad for grinding wheel (MR) ..... Aug. 29 4
Electrolytic coating to protect molybdenum (MR) ..... Mar. 28 4
Electron beams instantly cure solvent-free coats (MR) ..... June 20 3
Electron beam process cures paint coatings on wood products (T) ..... Feb. 28 21
Electrostatic hand gun handles two spraying jobs (MR) ..... Feb. 28 4
Fabricating zinc-coated steel. Roger Gardner (tables) ..... Feb. 14 83
Galvanized coat affects spotwelds on sheet steel (MR) ..... Sept. 26 4
Hot-rolled steel gets diffusion-bonded nickel coat (MR) ..... Dec. 5 4
1966 outlook -- Technical: cleaning and finishing (report) ..... Jan. 17 124
Space-age paint -- aluminum melts while its paint coating is intact (MR) ..... May 23 4
Spray-on material provides mask for electro-coating (MR) ..... July 4 4
Surface treatments for cutting tools. (Ref. Bk. Sheet) ..... May 23 135
Titanium oxide surface layer protects tools (MR) ..... June 20 4
Tungsten coatings applied by vapor-phase deposition (MR) ..... Apr. 11 4
Water cuts the cost of coating ..... Sept. 26 111

Coining (see Stamping)

Cold Treatment
Alloy for cryogenic jobs (T) ..... Apr. 25 37
Center drilling is replaced by cold forming (MR) ..... Feb. 14 3
Cold extrusion. S.D Brootzkoos (charts & tables) (report) ..... Oct. 10-135-150
Cold extrusion saves 65% in material for VW (MR) ..... July 18 4
Cold-finished carbon steel bars. F.E. Chepko (Ref. Bk. Sheet) ..... Aug. 1 111
Cold former swages, not squeezes, gears (MR) ..... Feb. 14 3
Finished splines cold formed in seven seconds (MR) ..... Mar. 14 3
How to work the super 12% Cr steels. Briggs & Parker (report) (charts & tables) ..... Mar. 14-139-150
VW figures prove out cold forming ..... July 18 121

Collets
Collet device positions work. R. Hill (PI) ..... June 6 152
Rubber ring expands to hold collets. J.R. Butler (PI) ..... Oct. 24 161

Compressed Air
Air controls machine tools -- Numatrol. Charley Emerson ..... Dec. 5 139
Air moves heavy tailstock. J. Schmidt (PI) ..... Jan. 31 86

Computers
Assembly banks pay high dividends (charts) ..... Sept. 26 121
Auto dies by computer -- AUTOSURF computer program. Jack Star ..... Nov. 21 112
Computer-aided retrieval system saves space, time (MR) ..... Nov. 21 4
Computer controls NC milling machine via telephone link (MR) ..... Aug. 29 3
Computer designs major components of machine tools (MR) ..... June 20 4
A computer picks a machine. J.M. Schaefer (tables) ..... Aug. 1 93
Computer reads feedback data from Tig arc (MR) ..... Sept. 26 4
Computer takes on new jobs in the auto industry. Charles Emerson ..... Jan. 3 55
Contouring on point-to-point NC. George DeGroat ..... Aug. 15 110
Estimating with a computer. Charles Emerson ..... Nov. 21 115
Family of computer-independent modular APT III postprocessors, written entirely in FORTRAN IV (T) ..... Aug. 29 39
Getting started with NC (report) (charts & tables) ..... Nov. 7-147-162
Planning. R.H. Cowan ..... Nov. 7 148
Selection. H. Van Parys ..... Nov. 7 155
Installation. R.P. Risch ..... Nov. 7 158
Paperwork. C.F. Brown ..... Nov. 7 161
How IBM presets NC tooling. G.R. Nelson ..... Apr. 25 97
Integrated-circuit computer is fast, compact, low-cost (MR) ..... Nov. 7 4
1966 outlook -- Technical: manufacturing control (report) ..... Jan. 17 125
Regenerative shop planning. R.B. Scott (report) (tables) ..... Mar. 28-89-94
Scheduling with a computer. Rupert Le Grand ..... Oct. 10 121
Specials 'built' by computer. James Sandford (tables) ..... Sept. 12 115
Whither NC? Asks DOD. R.L. Hatschek ..... Oct. 24 125

Contour Machining
'Bugs' shrink contouring NC ..... Aug. 29 77

(ed) Editorial. (MR) Metalworking Report. (PI) Practical Ideas. (T) Trends.

Contouring on point-to-point NC. George DeGroat ... Aug. 15 110
Contouring with point-to-point NC machines (MR) ... Feb. 14 3
Disk-type cutters are best for shaped honeycomb (MR) ... May 9 4
Faster way to contour mill jet engine cases. Rupert Le Grand ... Mar. 28 72
Integrated circuits incorporated in three-axis contouring NC system (T) ... Jan. 31 17
Low-cost NC contouring. James Sandford (chart) ... Apr. 25 83
NC retrofit speeds Apollo production ... Apr. 11 131
Plasma cutter can contour at speeds to 250 ipm (MR) ... Apr. 25 3
Turning to microinches ... Nov. 7 145
Welding a tilted contour for the Shillelagh bulkhead assembly. George Merrick & others (tables) ... Aug. 1 100

Coolants (see Cutting Fluids)

Copper
Aluminum is copper plated by phosphate anodizing (MR) ... June 6 4
How to clean copper parts (Ref. Bk. Sheet) ... May 23 137
Stellite markets porous metal sheet (T) ... June 20 41
What's new in powder metallurgy. George DeGroat (report) (table) ... Oct. 24-135-154

Corrosion
Infra-red heaters control condensation and improve working conditions in metal products warehouse ... Sept. 26 105
Precoated steels. C.M. Parker (report) (tables) ... Sept. 12-129-136
Removable type of corrosion preventative (MR) ... June 6 4
Valve seat pores are sealed to prevent corrosion (MR) ... Oct. 24 4

Counterbores and Countersinks
Geared head motor drives countersink. E. Jones (PI) ... Oct. 10 166
Standard pins and gage blocks amplify countersink check. E.J. Goulet (PI) ... Nov. 7 174

Cut-off
Abrasive cutoff – ASME meeting ... Dec. 19 91
Curl groove aids cutoff. R. Parmley (PI) ... May 9 138
Custom-built, cut-to-length line. Frank Richardson ... Jan. 31 69
Cutoff fixture. D.F. Kimberling (PI) ... Sept. 26 136
Numerical readout for cutoff saws. H. Koslow (PI) ... May 23 142
Scale holder aids cutoff. D. Rowland (PI) ... Feb. 28 110
Setup to cut off and mill flat. C. McLaughlin (PI) ... Jan. 3 93
Tripling production during cutoff. P.T. Henning (PI) ... July 18 139
Tube shear makes clean, burr-free cuts (MR) ... Nov. 21 3
Work supported during cut-off. R. Phillips (PI) ... Apr. 11 252
Workpiece counter for lathe. R. Hill (PI) ... Feb. 14 105

Cutting Fluids and Coolants
Container aids coolant flow. C. McLaughlin (PI) ... Sept. 26 136
Device detects cutting heat, cues for cooling fluid (MR) ... Nov. 21 4
Groove stops coolant spillage. C. Brown (PI) ... Mar. 14 159
Light test for cutting fluids (MR) ... Dec. 19 4
New fluids permit improved cutting of titanium (MR) ... Aug. 29 3
Oil cools drills at 750 psi. H.C. Lindberg ... Apr. 25 101
Pulsing coolant speeds drilling. E.A. Rich (charts & tables) ... Apr. 25 86
Pulsing coolant speeds drilling, extends tool life (MR) ... Apr. 25 3

Cutting Tools
Air motor speeds NC drill spindle (MR) ... Oct. 10 3
ASME winter meeting highlights ... Dec. 19 91
Cartridge tools can be installed in the shop (MR) ... May 9 3
Cutters take interrupted cuts in the bore of an aluminum, anti-smog air pump for autos (cover) ... Jan. 3 1
Cutting internal grooves. E. Jones (PI) ... Dec. 19 124
Cutting long shafts without supports. H. Divaris (PI) ... Apr. 25 116
Cutting odd-size gaskets. D. Teshy (PI) ... Feb. 14 106
Cutting radii on a lathe. A. Freiling (PI) ... Apr. 25 116
Cutting tool geometry – ASME meeting ... Dec. 19 91
Diamond tool makes some 'impossible' cuts (MR) ... June 20 4
Disk-type cutters are best for shaped honeycomb (MR) ... May 9 4
Explosive charges cut steel strip on-the-fly (MR) July 4-4 ... Aug. 1 161
Fast ways to change work. B.C. Brosheer (report) 3. Standard and special devices for gripping workpieces for machining ... Apr. 11-137-152
How heat affects tool wear. K.J. Trigger (charts) ... July 18 101
How to cut work square. F. Adams (PI) ... Jan. 3 94
An 'impossible' diamond tool to machine Gemini heat shield ... June 20 120
Jet of water at supersonic speed? New cutting tool (MR) ... Oct. 24 4
Laser pierces diamond dies for wire-drawing (MR) ... Jan. 3 3
Making chamfered pins. E. Jones (PI) ... July 4 105
Needed: reliable machinability data. Norman Zlatin (chart) ... Sept. 26 109
New advances in cutting tool materials (T) ... Nov. 21 41
New system presets single-point tools (MR) ... May 9 3
1966 outlook – Technical: cutting (report) ... Jan. 17 110
Optical tracer guides mill for barrel cam (MR) ... Feb. 28 3
Plasma cutter can contour at speeds to 250 ipm (MR) ... Apr. 25 3
Quick-indexing, positive-rake tools introduced (MR) ... Jan. 31 3
Rotary cutter shaves large gears (MR) ... Jan. 3 4
Rubber inserts hold wire in cutters. D.F. Kimberling (PI) ... Oct. 24 161
Slitting cutter trimmed to cut odd-size slots. B. Long Jr. (PI) ... July 18 140
Solder wire is cut quickly. B. Long, Jr. (PI) ... May 9 138
Surface treatments for cutting tools (Ref. Bk. Sheet) ... May 23 135
Tandem carbide inserts cut replacement costs. E. Goulet (PI) ... May 9 138
Templet-controlled flame-cutter cuts 45-foot-long steel plates to extra-close tolerances (cover) ... Dec. 5 1
Titanium oxide surface layer protects tools (MR) ... June 20 4
Tool for cutting deep slots. C. McLaughlin (PI) ... Dec. 19 123
Tool to cut grooves for retaining rings. E. Jones (PI) ... Dec. 5 164
Ultrasonic cutter can even be used to machine glass (MR) ... July 18 3
The versatile adaptive control. Reynolds & Norwood ... May 23 103
Worm gear cut quickly. D.M. Garrett (PI) ... Nov. 7 173

Cylinders – Hydraulic cylinder leak tests. F. Adams (PI) ... Feb. 28 110

Czechoslovakia – Brno: window on the East. F.H. Baer ... Dec. 5 150

D

Data Processing (see Computers)

Deburring
Geared head motor drives countersink. E. Jones (PI) ... Oct. 10 166
Hand deburring tool. A.T. Pippi (PI) ... Oct. 10 166
Handy deburring tool made from old drill. F. Rush (PI) ... Mar. 14 160
Portable tool removes burrs from tubing (MR) ... Jan. 17 4
Spring-loaded hole deburrer cleans both ends (MR) ... June 20 4
Tool removes filing burrs. F. Fehely (PI) ... May 9 137
Tool spins burrs off plate. D. Blasioli (PI) ... Mar. 14 160

Degreasing (see Cleaning)

Depreciation
The push for modernization (tables) ... Dec. 5 128
62% of Britain's machine tools over-age (charts) ... Sept. 26 114

Design
Computer designs major components of machine tools (MR) ... June 20 4
How to skeletonize products – working with steel wire ... Apr. 25 90

Diamonds, Industrial
Diamond grinding today. J.J. Dwyer Jr. ... Oct. 24 122
Diamond grit is metal clad for grinding wheel (MR) ... Aug. 29 4
Diamond tool makes some 'impossible' cuts (MR) ... June 20 4
How users evaluate diamond wheels ... Feb. 14 79
An 'impossible' diamond tool to machine Gemini heat shield ... June 20 120
Improved bond for diamond wheels (T) ... Oct. 10 43
Plating with diamonds. Kenneth Gillis ... May 9 102
Process for plating tools with diamond grit (MR) ... Feb. 28 4
Single-layer diamond wheel grinds forms (MR) ... July 4 3
Synthetic diamond produced by shock-wave action (MR) ... Mar. 28 3

Die Casting
Automatic feed for die casting uses inert gas (MR) ... Nov. 7 3
Brass alloys are low melting, can be die cast (MR) ... Apr. 25 4
British machine automates low-pressure casting (MR) ... Dec. 5 3
Cast dies for auto forgings. Charles Emerson ... Oct. 10 132
Dial M for mechanization at Eastman Kodak's Camera Works ... Sept. 26 103
Die castings take on new jobs in Europe ... Dec. 5 129
GE does it: die-casts ferrous metals (MR) May 23-3 ... May 23 111
HERFing in a Shaw-cast die ... July 4 68
Oil cools drills at 750 psi in drilling aluminum die-castings. H.C. Lindberg. ... Apr. 25 101
Proposed action on new standardization of die casting machines (T) ... Dec. 5 21
Radiographic standards for castings (T) ... Mar. 28 43
Silicate cores hold shape for die casting (MR) ... Dec. 5 4
Tips on hydraulics from Vickers Machinery Hydraulics Conference ... July 4 73
Tooling up for better die casting (T) ... Aug. 15 47

Dies
Air-electric controls for dies. M.J. Goldstein ... Feb. 28 86
Auto dies by computer – AUTOSURF computer program. Jack Star ... Nov. 21 112
Bennett, Edward checks size of parts stamped out by his new, all-steel short-run die (cover) ... Aug. 1 1
Bulging dies go glamorous ... Jan. 17 77
Buttons replace transfer screws for die-making (MR) ... Aug. 29 4
Carbide dies stamp parts from 1%-silicon steel (MR) ... June 6 3
Compound die for heavy work. M.J. Goldstein ... May 23 114
Cost is justified by long life of maraging steel die (MR) ... Dec. 5 4
Diemaker turns parts maker – Carbidex ... Dec. 5 125
Diemakers build machines too. Rupert Le Grand ... July 4 70
Double cam slide boosts punch travel ... Dec. 5 138
Draw dies are being replaced by tangent bending (MR) ... Jan. 31 4
Laser pierces diamond dies for wire-drawing (MR) ... Jan. 3 3
Low cost bending die handles short runs. R. Grenon (PI) ... May 9 137
New system uses steel dies for short runs (MR) ... July 18 3
1966 outlook – Technical: forming (report) ... Jan. 17 115
Notched blanking die saves materials. H. Murro (PI) ... Jan. 3 93
NC at Ford. Emerson & Hatschek ... Jan. 17 90
NC-contoured stretch dies hold closer tolerances for aircraft sheet metal parts. Max Lofton ... Aug. 15 108
The push for NC die milling ... Jan. 17 89
Steel die kit for short runs – Bennett die. Rupert Le Grand ... Aug. 1 104
Steel-rule dies, 1 & 2. J.J. Raphael (Ref. Bk. Sheets) ... Jan. 3 87
Swinging die draws and pierces. C. McLaughlin (PI) ... Dec. 5 163
Tonnage chart for various bend angles. R.F. Dehn (Ref. Bk. Sheet) (chart) ... Apr. 11 247
Tonnage for air bends, 1 & 2. R.F. Dehn (Ref. Bk. Sheets) (chart) ... Mar. 28 97
Tool for odd-shaped shell. M. Goldstein (PI) ... Jan. 31 85
Urethane die gets 'workhorse' role. C.H. Becker ... Jan. 31 72

Dimensioning (see Drafting)

Dividers – Divider scribes small circles. H. Koslow (PI) ... Aug. 1 118

(ed) Editorial. (MR) Metalworking Report. (PI) Practical Ideas. (T) Trends.

Drafting
Drafting method simplifies steel-rule-die building. E.J. Goulet (PI) — Aug. 15 129
3-D coordinates located direct from clay models (MR) — Jan. 31 4

Drawing (see Stamping)

Drilling
Adhesive holds ceramic cutting edge on drill bit (MR) — Feb. 14 3
All-around drill jig. J. Schmidt (PI) — June 20 155
Carbon steel drill upgraded. S. Clark (PI) — Oct. 10 165
Centerdrill does double duty. R. Jagen (PI) — Sept. 12 147
Detachable tips aid sharpening of gun drill (MR) — May 9 3
Drill guide for lathe. R.J. Phillip (PI) — Oct. 24 161
Drill press setup speeds finishing. C. McLaughlin (PI) — Aug. 29 91
Drill substitutes for transfer punch. F. Fehely (PI) — Mar. 28 108
Drilling holes in angle iron. R. Phillip (PI) — Aug. 1 118
Drilling holes in rubber. N. Bradley (PI) — Mar. 14 159
Drillpress does tapping, too — Aug. 15 122
Drills that won't slip. W. Bullough (PI) — Apr. 25 115
Gun drilling goes to great lengths — Nov. 21 111
How to drill fine holes. J. Grossman (PI) — Dec. 19 125
How to machine a giant. H.A. Squires — Mar. 14 132
Machining center adapted for NC gun drilling (MR) — Feb. 28 4
Machining time cut 72% by vertical driller (MR) — Mar. 14 4
Modified drills make holes only 0.002-in. larger (MR) — Feb. 14 3
Monitor system for drill force (MR) — Dec. 19 4
A new look at stainless. S.E. Tyson (report) (charts & tables) — May 9-115-126
1966 Tool Show Report — May 9 104
NC drilling beyond normal table range. C. Brown (PI) — Jan. 17 139
Oil cools drills at 750 psi. H.C. Lindberg — Apr. 25 101
Picatinny Arsenal 'silent room' -- Drilling by ear. Joseph Kuletz — July 4 63
Pulsing coolant speeds drilling. E.A. Rich (charts & tables) — Apr. 25 86
Reversible drill jig. O.M. Baker (PI) — June 20 156
Sleeve assists centerdrill. E.J. Goulet (PI) — July 18 139
Triple play on an NC machine. B.C. Brosheer — Sept. 26 126
Twist drill has 3 coolant holes in each flute (MR) — Sept. 12 3
The versatile adaptive control. Reynolds & Norwood — May 23 103

Drives
Hydraulic drive system prevents backlash (MR) — Jan. 17 4
Short run hobbing on a rotary for variable speed drives. George Viscomi — July 4 66

E

Education (see Training)

Electrical and Electronic Manufacturing
Automatic Electric Co. switches from lard oil to reclaimable petroleum-base cutting oil — Apr. 11 126
'Bugs' shrink contouring NC — Aug. 29 77
Building batteries for space. W.J. Conner — Mar. 14 121
Diemaker turns parts maker -- Carbidex — Dec. 5 125
Electrical cables may have sodium conductors (MR) — Jan. 17 4
Fuel cells for industrial applications (T) — Mar. 14 25
Safety Sentry breaks circuits before disaster (MR) — Apr. 11 4
Tracing takes on a new job. George DeGroat — June 20 117
Triple play on an NC machine. B.C. Brosheer — Sept. 26 126

Electrical Machining
And now it's ECDM! Combination of electrochemical and electrical discharge machining enables graphite wheel to grind carbides and exotic alloys five times faster than diamond wheels. George De Groat — Apr. 11 123
British PERA announces ECM breakthrough (MR) — Jan. 31 3
The case for the tailored arc — May 9 101
Cutting with a spark: Here's what EDM can do. James Sandford (report) (charts & tables) — July 4-77-92
Dual tooling for EDM-ECM. Charles Emerson — Aug. 15 112
ECM tailored for precision. LaBoda & McMillan — Dec. 5 144
ECM teams up with NC to solve problem at Xerox — June 20 128
ECM user survey — Aug. 15 171
EDM cost for making cavity dies cut with new circuitry (T) — Apr. 25 19
EDM cuts hole in V-block to handle headed pins. C. Frank (PI) — Feb. 14 105
EDM electrodes for machining large (12-inch-dia) aerospace parts (T) — Apr. 25 19
EDM makes it big at Chrysler Corp.'s stamping plant — June 20 132
EDM spark discharge between a carbon electrode and a copper block (cover) — July 4 1
Electrolytic coating to protect molybdenum (MR) — Mar. 28 4
Electronically controlled coil line levels, round edges, and cuts (MR) — Apr. 11 3
Electrostatic hand gun handles two spraying jobs (MR) — Feb. 28 4
The 'far out' processes get a going over -- laser interferometry. R.L. Hatschek — Nov. 21 108
Flame cutting to tight specs. George DeGroat — Dec. 5 133
Gold plating costs come down. J.E. Sandford (table) — Jan. 3 62
Machining the complex part — Sept. 12 107
1. Automating for low volume. B.C. Brosheer — Sept. 12 108
2. Automating for high volume. Charles Emerson — Sept. 12 111
1966 outlook: Technical (report)
Cutting — Jan. 17 114
Forming — Jan. 17 115
1966 Tool Show Report — May 9 104
Power supply curbs EDM electrode wear (MR) — Dec. 5 4
Putting accuracy into EDM. James Sandford — Nov. 7 141
Short-arc shortcuts pipe welding — Jan. 3 65
Spark-discharge machine has NC for microengraving (MR) — May 23 4
Spraying metal by electric arc. Joe Rosenbery — Jan. 31 66
Ultra-high-speed grind is result of ECM plus EDM (MR) — Mar. 14 3
UN symposium in Moscow (T) — Sept. 26 37

Electrodes
Building batteries for space at Lockheed. W.J. Conner — Mar. 14 121
Cutting with a spark: Here's what EDM can do. James Sandford (report) (charts & tables) — July 4-77-92
EDM cost for making cavity dies cut with new circuitry (T) — Apr. 25 19
EDM electrodes for machining large (12-inch-dia) aerospace parts (T) — Apr. 25 19
EDM electrode speeds cutting of deep slots. R. Killam (PI) — Nov. 7 174
Power supply curbs EDM electrode wear (MR) — Dec. 5 4
Putting accuracy into EDM. James Sandford — Nov. 7 141

Electroforming
Exotic metal parts get shock-wave treatment — Aug. 29 109
Pressure vessels formed with wire and electroforming (MR) — Aug. 29 4

Electrolytic machining (see Electrical machining)

Electron Beam
Electron beam process cures paint coatings on wood products (T) — Feb. 28 21
Electron beam welds 5-in.-thick stainless — Feb. 14 179
Electron beams instantly cure solvent-free coats (MR) — June 20 3
Electron gun capable of focusing electrons to a spot 0.0005 in. in diameter (T) — Jan. 3 21
HCD welding gun uses low-voltage electron beams (MR) — Sept. 26 3
Indexing machine assists vacuum EB welder (MR) — May 9 4
Portable (and non-vacuum) electron-beam welder (MR) — Apr. 25 4

Electron Beam (see also Electrical Machining)

Electroplating (see Plating)

Embossing (see Stamping)

Engineering drawings (see Drafting)

Estimating -- Estimating with a computer. Charles Emerson — Nov. 21 115

Etching (see Chemical milling)

Explosive forming (see Forming)

Exports
Mexico boosts RR car production — Feb. 28 92
Reds eye world tool market. Howard Rausch — Dec. 5 130

Extruding
Cold extrusion. S.D. Brootzkoos (charts & tables) (report) — Oct. 10-133-150
Cold extrusion saves 65% in material for VW (MR) — July 18 4
Progress in roll extrusion (T) — July 18 33

F

Fasteners
Fastener locks out index pin. R. Hill (PI) — Mar. 28 107
Fastening system automatically feeds and drives screws (MR) — May 9 4
Gear coupling said to outlast any other (MR) — Apr. 11 3
Sockets for power wrenches. J.R. Haynes (Ref. Bk. Sheet) — July 4 101
Stud mounts in sandwich panel without cell damage (MR) — Jan. 17 4

Feeding Devices
Chipbreaking with either oscillating feed or interrupted feed (MR) — Feb. 28 3
Compound feed geared down. R. Phillip (PI) — Jan. 3 94
Feed vs speed for tool life, 1 & 2, (Ref. Bk. Sheets) (charts) — Feb. 28 101
Finger triggers end of feed on tool room shaper. R. Phillip (PI) — July 18 140
USI going into press feeding equipment business (T) — Apr. 11 29

Fibers
Graphite fiber both resistant and flexible (MR) — Mar. 28 3
1966 outlook -- Technical: materials (report) — Jan. 17 119

Filament Winding -- Pressure vessels formed with wire and electroforming (MR) — Aug. 29 4

Filing
Rifler file made quickly. B. Long Jr. (PI) — Jan. 3 94
Tool removes filing burrs. F. Fehely (PI) — May 9 137

Finishing (Barrel and Vibratory)
Cold-finished carbon steel bars. F.E. Chepko (Ref. Bk. Sheet) — Aug. 1 111
Damming action separates parts from media (MR) — Nov. 21 4
Drill press setup speeds finishing. C. McLaughlin (PI) — Aug. 29 91
ECM tailored for precision. LaBoda & McMillan — Dec. 5 144
Electrostatic hand gun handles two spraying jobs (MR) — Feb. 28 4
1966 outlook -- Technical: cleaning and finishing (report) — Jan. 17 112
Organic coating has long life, high resistance (MR) — Sept. 12 4
'Peen and clean' process employs rotating wheels (MR) — Oct. 24 3
Precoated steels. C.M. Parker (report) (table) — Sept. 12-129-136
Surface treatments for cutting tools (Ref. Bk. Sheet) — May 23 135
Water cuts the cost of coating — Sept. 26 111

(ed) Editorial. (MR) Metalworking Report. (PI) Practical Ideas. (T) Trends.

Fixtures (see Jigs and Fixtures)

Flame Cutting
- Contact flame cutting for fast, more precise cuts (MR) — Dec. 19 3
- Flame cutting to tight specs. George DeGroat — Dec. 5 133

Flame Hardening (see Heat treatment)

Fluidics
- Fluidics — a fast comer in machine control — May 23 105
- Fluidics' replace electric controls on mills at B&S (MR) — Apr. 11 4
- A look at 'fluidic' machine controls. Brosheer & Hatschek — Apr. 11 134
- 1966 Tool Show Report — May 9 104
- Press control problem solved with fluidics (MR) — Apr. 25 3

Forging
- Cast dies for auto forgings. Charles Emerson — Oct. 10 132
- Drop-forged parts to close tolerances with same old process but new methods — Feb. 28 149
- Ford expands forge plant — Feb. 14 86
- Forge turns out railroad axles automatically (MR) — Sept. 12 4
- Forging today. F.E. Chepko (report) (chart) — Nov.21-121-136
- Green light for 200,000 ton press? (T) — Dec. 19 29
- Hammer forging is but one of the many ferrous forging techniques (cover) — Nov. 21 1
- HERFing in a Shaw-cast die — July 4 68
- 1966 outlook — Technical: forming (report) — Jan. 17 116

Forming
- Alloys can be formed like plastics (MR) — Feb. 14 4
- Center drilling is replaced by cold forming (MR) — Feb. 14 3
- Close tolerances obtained with cast titanium (MR) — Jan. 31 3
- Cold forming swages, no' squeezes, gears (MR) — Feb. 14 3
- Draw dies being replaced by tangent bending (MR) — Jan. 31 4
- Electrical upset of metal sheet forms weld edge (MR) — Aug. 1 4
- Electronically controlled coil line levels, rounds edges, and cuts (MR) — Apr. 11 3
- Epoxy blanket protects part for explosive forming (MR) — May 23 4
- Explosive forming — plastic cap resists fire and shock (MR) — Mar. 28 4
- Fabricating zinc-coated steel. Roger Gardner (tables) — Feb. 14 83
- Finished splines cold formed in seven seconds (MR) — Mar. 14 3
- Flexopresses have reduced height, deeper crowns (MR) — Dec. 19 3
- Flying die speeds roll forming at Alum-A-Form Co. George DeGroat — Feb. 28 78
- Forge turns out railroad axles automatically (MR) — Sept. 12 4
- Forming the dimple. A.T. Pippi (PI) — Sept. 12 147
- Fourslides make tubular parts at lower costs (MR) — Sept. 12 4
- Heavy-duty slitters hold close tolerances (MR) — Jan. 17 3
- How to work the super 12% Cr steels. Briggs & Parker (report) (charts & tables) — Mar. 14-139-150
- Interchangeable cams increase press speed (MR) — Oct. 10 4
- Liquid bulge forming producing steel butt-welding tees (MR) — Jan. 3 3
- Machine forms precision bellows with 40-in. OD (MR) — Dec. 19 4
- Molding a 10-foot plastic ball — Air Force's new space flight simulator. A.M. Guerreiro — Mar. 14 128
- New system uses steel dies for short runs (MR) — July 18 3
- 1966 outlook — Technical: forming (report) — Jan. 17 110
- NC for stretch dies hold closer tolerances for aircraft sheet metal parts. Wax Lofton — Aug. 15 108
- One step punching and forming. R.J. Phillip (PI) — May 23 141
- Press-brake bends. M.J. Mess (Ref. Bk. Sheet) — Nov. 7 167
- Press can form titanium pan shape in one piece (MR) — May 9 3
- Self-drilling screws are formed 10 times faster (MR) — Sept. 26 3
- Tooling a fourslide, 9. C.J. Labonack — May 9 108
- Two-sided wedge adds to cam slide speed, tool use (MR) — Dec. 5 3
- VW figures prove out cold forming — July 18 121
- 'Wasteless' billet-shearing process produces mirror-smooth, flat-faced slugs for cold forging (MR) — Jan. 3 3
- Working tube on a fourslide. E.V. Cavagnero (table) — Sept. 12 121

Forming (see also High-Energy Rate Forming, Stamping)
- France — Manpower around the world. Marilyn Myers — Dec. 5 152

G

Gaging
- Air gage for small bearing races cuts down regrind (MR) — Mar. 14 3
- Blanking strip with gages. Federico Strasser — Feb. 14 76
- Depth gage has level built into base. D. Kimberling (PI) — Mar. 28 108
- Dia-met gage compares rings and plugs (MR) — Jan. 17 4
- Expanded micrometer face gages rubber surfaces. E.J. Goulet (PI) — Nov. 21 145
- Gage checks three dimensions. R. Isetts (PI) — Nov. 21 146
- Gage inspects die pins. B. Lechler (PI) — Apr. 25 116
- Gage pin improves stop screw. R. Hill — Nov. 21 146
- Gage reads radius, fillet. E. Goulet (PI) — Sept. 26 136
- Indicator becomes depth gage. P. Cady (PI) — Jan. 3 93
- Low-cost welding gage. F.L. Rush (PI) — Nov. 21 146
- Non-contact gage ignores workpiece interruptions (MR) — May 23 3
- Rubber boot preserves thread gage accuracy. E.J. Goulet (PI) — Aug. 1 118
- Simple gage reads compression of welded seals (MR) — Jan. 3 3
- Spring insures centering of telescoping gages. D.F. Kimberling (PI) — Dec. 19 123
- Thickness gage takes 30 min for 300 measurements (MR) — Apr. 25 4
- Tiny fatigue-life gage, smaller than a fingernail (MR) — Jan. 17 3
- Tools lined up quickly in lathe. R. Jagen (PI) — Mar. 14 159

Gaskets — Cutting odd-size gaskets. D. Teshy (PI) — Feb. 14 106

Gearing
- Adjustable spur gear eliminates backlash. F. Adams (PI) — Mar. 14 160
- American Gear Manufacturers Assn. has published two new standards (T) — Dec. 19 25
- How to reduce hardening distortion in steel gears — Tuffriding process — Nov. 21 114
- New way to harden gears. Craig & Delinger — Apr. 25 103
- Short run hobbing on a rotary for variable speed drives. George Visconi — July 4 66

Gearing (see also Hobbing)
- Germany — Germany's Auto-Union, new life for an old automaker. Charles Emerson — Aug. 29 74

Glass
- Ground glass lubricant assures functioning of bearings above 600 F (MR) — Jan. 3 3
- Ultrasonic cutter can even be used to machine glass (MR) — July 18 3

Glass Fibers
- Fiberglass treatment — precatalyzing (MR) — Feb. 28 3
- Glass-reinforced thermoplastic resists 465 F (MR) — June 6 3

Gold — Gold plating costs come down. J.E. Sandford (table) — Jan. 3 62

Graphite
- ECDM enables graphite wheel to grind carbides and exotic alloys five times faster than diamond wheels. George De Groat — Apr. 11 123
- Graphite fiber both resistant and flexible (MR) — Mar. 28 3
- Synthetic diamond produced by shock-wave action (MR) — Mar. 28 3

Great Britain
- Manpower around the world — England. Dan McCrary — Oct. 24 131
- 62% of Britain's machine tools over-age (charts) — Sept. 26 114

Grinding
- Abrasive machining in focus. J.E. Haggett (chart) — Aug. 29 70
- Air gage for small bearing races cuts down regrind (MR) — Mar. 14 3
- Angled grinding wheel prevents burning. P.T. Hennig (PI) — Sept. 12 147
- Diamond grinding today. J.J. Dwyer Jr. — Oct. 24 122
- Disk wheel has cement-bonded abrasive plugs (MR) — Oct. 24 3
- ECDM enables graphite wheel to grind carbides and exotic alloys five times faster than diamond wheels. George De Groat — Apr. 11 123
- Fine grinding of huge plates. J.E. Sandford — Mar. 28 86
- Fixture permits fine grinding. R. Dressler (PI) — Apr. 11 251
- Getting more rpm from small grinding wheels. H.J. Miller (PI) — June 20 155
- G-ratios in surface grinding (Ref. Bk. Sheet) — Sept. 12-137-139
- How users evaluate diamond wheels — Feb. 14 79
- Improved bond for diamond wheels (T) — Oct. 10 43
- Making precision angle plates. P. Kagan (PI) — Oct. 24 161
- Multiple-wheel internal grinding. Fred Thomas (Ref. Bk. Sheet) — Sept. 26 127
- 1966 outlook — Technical: cutting (report) — Jan. 17 114
- NC grinder cuts auto cams. Yasumasa Ishihara — Sept. 26 112
- NC grinder cuts camshaft leadtime (MR) — July 18 3
- Polyimide bond improves diamond grinding wheel (MR) — Oct. 10 3
- Quick pointers on tooling. A.T. Pippi (PI) — Aug. 1 117
- Sharp ideas raise knife output. Harry Mote — July 18 124
- Single-layer diamond wheel grinds forms (MR) — July 4 3
- Standard details good grinding practices (MR) — Aug. 15 4
- Surface treatment for cutting tools (Ref. Bk. Sheet) — May 23 135
- Tool-grinding fixture has angles built in (MR) — June 6 4
- Ultra-high-speed grind is result of ECM plus EDM (MR) — Mar. 14 3
- Vertical-spindle grinding — ASME meeting — Dec. 19 91
- Wheel wobble does some good. U. Heiman (PI) — Apr. 11 252

Grooving
- Cutting internal grooves. E. Jones (PI) — Dec. 19 124
- Fine-grooving for 3-D prints. B.C. Brosheer — Oct. 24 119
- Groove stops coolant spillage. C. Brown (PI) — Mar. 14 159
- Pins grooved in a hurry. G. Oates (PI) — Jan. 17 140
- Precision grooving operation on a brass roll is the key to producing the embossed plastic sheet for this three-dimensional photograph (cover) — Oct. 24 1
- Turret lathe tool cuts V-grooves. J. Waller (PI) — Nov. 21 145

Guided Missiles (see Aerospace Mfg.)

Guns (see Ordnance Manufacturing)

H

Hafnium — R&D in hafnium and zirconium (T) — May 9 41

Hammers (see Forging)

Handles
- Cover protects vise handle. F. Fehely (PI) — June 6 152
- Safety handle for vise. F. Fehely (PI) — May 23 142

(ed) Editorial. (MR) Metalworking Report. (PI) Practical Ideas. (T) Trends.

Hardening (see **Heat Treatment**)

Hardness Testing
Brittleness goes out, hardness stays in .. Nov. 7 144
Electronic device improves classic hardness test (MR) Mar. 14 4
Needed: reliable machinability data. Norman Zlatin (chart) Sept. 26 109

Heaters
Infra-red heaters control condensation and improve working conditions in metal products warehouse Sept. 26 105
Radiant-heater system works for brazing aluminum (MR) Apr. 25 4

Heating & Heat Treatment
A guide to heat treating from Winchester Western. R.L. Suffredini (charts) July 18 111
Heat regulator holds exact temperatures (MR) July 18 4
Heat treatment of alloy steels (Ref. Bk. Sheets) (tables) July 18 133
How heat affects tool wear. K.J. Trigger (charts) July 18 101
How to reduce hardening distortion in steel gears – Tuffbriding process Nov. 21 114
How to work the super 12% Cr steels. Briggs & Parker (report) (charts & tables) Mar. 14-139-150
Light bulb heats bearings. D.F. Kimberling (PI) Aug. 29 92
Marquench cuts distortion, costs of bearing rings Jan. 17 86
'Melting-Point Furnace' – resistance heating speeds measuring of melting points (MR) Mar. 28 4
New way to harden gears. Craig & Delinger Apr. 25 103
1966 outlook – Technical: heat treating (report) Jan. 17 113
Prehardened strip cuts cost (charts) July 18 118
Quench furnace runs the gamut Mar. 28 75
Stress aging gives steel alloy ultrahigh strength Aug. 15 3
Surface treatments for cutting tools. (Ref. Bk. Sheet) May 23 135
To remove crust – heat, not hammer, plating-bath coils (MR) Apr. 11 4
Wyman-Gordon adds melt shop, improves its forgings Nov. 21 195

High Energy Rate Forming
Dynapack high-energy-rate-forming machine (T) May 9 21
Forging today. F.E. Chepko (report) (chart) Nov. 21-121-136
HERF hangs out using extrusions July 18 115
HERFing in a Shaw-cast die July 4 68
High-speed, high-energy-rate forming machine (MR) Feb. 14 4
SoniForm uses electro-hydraulic shock waves (MR) Aug. 15 3
What? Asymmetric HERFing? R.L. Hatschek June 20 122
What's new in powder metallurgy. George DeGroat (report) (table) Oct. 24-135-154

Hobbing
NC device reduces gearhobbing errors (MR) July 4 3
Short-run economy of a four-spindle rotary gear-hobbing machine (MR) July 4 4
Short run hobbing on a rotary for variable speed drives. George Visconi July 4 66
Why hob preferences differ (T) Dec. 5 41

Hoists (see **Materials Handling**)

Honeycomb – Disk-type cutters are best for shaped honeycomb (MR) May 9 4

Honing – Manual stroke honing at work. B.R. McConnell Sr. (tables) Mar. 28 79

Hydraulic Equipment
Clamping system combines ship a'-oil reservoir (MR) Nov. 21 3
Hot presses bond skin to helicopter blades Apr. 25 100
Hydraulic clamping simplified. Harry Mote Dec. 5 135
Hydraulic cylinder leak test. F. Adams (PI) Feb. 28 110
Hydraulic drive system prevents back-lash (MR) Jan. 17 4
Hydraulic 'press pacer' works at top speed (MR) Oct. 24 3
Tips on hydraulics from Vickers Machinery Hydraulics Conference July 4 73
Tracing takes on a new job. George DeGroat June 20 117

I

Imports
Machine tool imports nearly double (T) Dec. 19 39
Tariffs edging down on Canadian imports (T) Jan. 17 31

Indexing
Dial 🅱 for mechanization at Eastman Kodak's Camera Works Sept. 26 103
Handle for index heads. F. Rush (PI) Feb. 14 106
Indexing machine assists vacuum EB welder (MR) May 9 4
Locking-type indexing fingers. Federico Strasser (Ref. Bk. Sheets) 1. Nov. 21-139, 2. Dec. 5-157, 3. Dec. 19 139

Indicators
Indicating aid for lathe work. C. McLaughlin (PI) Apr. 11 252
Indicator becomes depth gage. P. Cady (PI) Jan. 3 93

Inspection
British-developed instruments: electron microscope and surface-texture recorder (MR) June 6 3
Epidiascope magnifies large areas (MR) Sept. 12 4
Gage checks three dimensions. R. Isetts (PI) Nov. 21 146
Gage inspects die pins. B. Lechler (PI) Apr. 25 116
Improved device detects pinholes in moving strip (MR) Aug. 15 3
Infrared device detects faulty circuit solders (MR) Aug. 1 4
Laser measures 80 feet in one step (MR) Mar. 28 3
Leak detector for tubes' critical, brazed joints (MR) Mar. 14 4
1966 outlook – Technical: inspection and testing (report) Jan. 17 112
Press-O-Film on surface gives 3-D replica (MR) Nov. 7 4
Readout/printout device documents quality control (MR) Aug. 1 3
Rotary table has increased weight-carrying capacity (MR) Jan. 3 4
Table top inspection mirror. F. Lettino (PI) Jan. 17 140
TV catches machine jams, documents methods (MR) Dec. 5 3
TV monitor of metal flaws uses ultrasonic imaging (MR) Feb. 14 4
Wafer-sized sensor measures metal fatigue (MR) Jan. 17 3
Why a measuring machine? L.R. Ormston Sept. 26 122

Inventory – 1966 outlook – inventory levels signal drop in steel production (chart) (report) Jan. 17 100

Italy – Manpower around the world. Jack Star Sept. 12 126

J

Japan
NC grinder cuts auto cams. Yasumasa Ishihara Sept. 26 112
Third International Machine Tool Show: Three rings for Osaka. Anderson Ashburn Nov. 7 135

Jig Boring (see **Boring**)

Jig Grinding (see **Grinding**)

Jigs and Fixtures
All-around drill jig. J. Schmidt (PI) June 20 155
Cutoff fixture. D.F. Kimberling (PI) Sept. 26 136
Cutting thin disks in a lathe. J. Schmidt (PI) June 6 152
Dowel pin jig for grinding. R.J. Hill (PI) Sept. 26 135
Fast acting jig cuts finished bars. R. Hill (PI) Mar. 14 160
Fast fixture for long runs. R. Phillips (PI) Sept. 12 148
Fast ways to change work. B.C. Brosheer (report) 3. Standard and special devices for gripping workpieces for machining Apr. 11-137-152
Fixture aids drilling. J. Schmidt (PI) Mar. 28 108
Fixture holds thin work. D.F. Kimberling (PI) Aug. 15 130
Fixture permits fine grinding. R. Dressler (PI) Apr. 11 251
Flexible fixture has a tight grip (PI) Oct. 10 165
Gemini capsule section is held in a spotwelding fixture that floats on a film of air (cover) May 9 1
Gemini spacecraft – fingertips move weld fixtures at McDonnell Aircraft. Dubuisker & Robertson May 9 97
Hand reaming jig. F.L. Rush (PI) June 6 151
Multiple parts fixture. P.T. Hennig (PI) Oct. 10 165
Multiple setups speed output. B.C. Brosheer May 9 111
Quick-acting milling fixture. F. Strasser (PI) Jan. 17 140
Reamer fixture saves time. D. Kimberling (PI) June 20 156
Reversible drill jig. O.N. Baker (PI) June 20 156
Spring clamps hold work in welding fixture. D. Rowland (PI) Apr. 25 116
Threaded diameter locates workpiece. J. Waller (PI) May 9 137
Tool-grinding fixture has angles built in (MR) June 6 4
Work rest is located by part being cut. E. Goulet (PI) Apr. 25 115

Job Shops
Bendix's space-oriented facility at Cape Kennedy – job shop for NASA space vehicles Feb. 14 82
Contouring on point-to-point NC. George DeGroat Aug. 15 110
Contract shop prepares NC tapes for companies with overloaded parts programmers. George DeGroat Jan. 31 70
Diemakers build machines too. Rupert Le Grand July 4 70
Fast polish for stainless sheet. James Sandford July 18 130
Keep production flowing with master production order. A.T. Eyman Oct. 24 127
Retooling for nuclear power – at GE's LST – G. Harry Mote Sept. 26 116
Scheduling with a computer. Rupert Le Grand Oct. 10 121

K

Keys and Keyways
Driver for gib keys. J. Schmidt (PI) Oct. 24 162
Keyway cutting on the engine lathe. D.F. Kimberling (PI) May 23 141

L

Labor
Aerospace employment to rise (T) Apr. 11 43
Bell Helicopter's 'diagramatic planning': helicopters in a hurry. Marvin Reid Dec. 19 94
British government's fight to solve shortage of skilled labor will include use of NC. R.L. Hatschek May 23 106
Machine operator decline forecast (T) Oct. 24 37
Manpower around the world
Brazil. Wes Perry June 20 142
England. Dan McCrary Oct. 24 131
France. Marilyn Myers Dec. 5 152
Italy. Jack Star Sept. 12 126
Mexico. Bruce Cross July 18 126
NMTBA second survey of 22 companies measures shortage of manpower (T) Jan. 31 37
1966 outlook – what's happening to wages and prices (table) (report) Jan. 17 106
Not enough are running (ed) Dec. 19 83
The Quaker and the Quill (ed) Jan. 17 75
Tighter labor market looms Mar. 28 87
...how will this affect wages and prices? Mar. 28 88
The training explosion report June 6-95-142
USSR faces unskilled surplus. Don Winston Mar. 14 126

(ed) Editorial. (MR) Metalworking Report. (PI) Practical Ideas. (T) Trends.

Lapping – Simple lapping tool. R. Phillip (PI) ... Jan. 31 86

Lasers
Coaxial laser 'pump' (MR) ... Mar. 14 3
Continuous laser reaches 75 watts, 500 watts in lab (MR) ... May 23 3
Danger – laser. Rex Rhein ... June 20 119
Gas laser has continuous beam, not pulsed (MR) ... Feb. 28 3
GT & E researchers develop inorganic liquid laser (MR) ... Sept. 12 3
Laser interferometry. R.L. Hatschek ... Nov. 21 108
Laser measures 80 feet in one step (MR) ... Mar. 28 3
Laser pierces diamond dies for wire-drawing (MR) ... Jan. 3 3
Metalworking gets low-cost laser systems (MR) ... Aug. 1 3
1966 outlook – Technical: inspection and testing (report) ... Jan. 17 121
Shop laser checks NC positioning accuracy at Lockheed-Georgia. James Sandford ... Nov. 21 118

Lathes (see Turning)

Law
Italy's machine tool leasing law (T) ... May 23 39
Product liability – the big risk (T) ... Nov. 7 43

Layout
Atomizer sprays layout dye. H. Josephs (PI) ... Sept. 12 148
Fast ways to change work. B.C. Brosheer (report) 3. Standard and special devices for gripping workpieces for machining ... Apr. 11-137-152
Holes laid out on lathe. R. Jagen (PI) ... Jan. 17 139
One chucker outworks two lathes at American Bosch Arma Corp. ... Feb. 28 85
Work centers tackle big jobs for Rockwell Manufacturing plant at Uniontown, Pa. W.E. Ramsden ... July 18 104

Leasing of Machinery – Italy's machine tool leasing law (T) ... May 23 39

Lubrication
Ground glass lubricant assures functioning of bearings above 600 F (MR) ... Jan. 3 3
Hydraulic clamping simplified. Harry Mote ... Dec. 5 135
Trimming fat from oil costs – Automatic Electric switches from lard oil to reclaimable petroleum-base cutting oil ... Apr. 11 126

M

Machine Tool Show (see Tool Show)

Machine Tools
Aerospace industry studies future machine tool needs (T) ... May 23 39
Air controls machine tools – Numatrol. Charles Emerson ... Dec. 5 139
All-NC show bows at Olympia. R.L. Hatschek ... May 23 106
Army's do-it-yourself specials. Sydney Glossop ... June 20 136
Arrow Tool marks 25th year, opens new and bigger plant ... Oct. 24 237
A brief stop on cloud eight (ed) ... Aug. 1 87
Brittleness goes out, hardness stays in ... Nov. 7 144
Bmo: window on the East. F.H. Baer ... Dec. 5 150
Builders push fight for 'essentiality' ... Aug. 15 106
Carbide-tool breakage. V.G. Yost (Ref. Bk. Sheets) ... Apr. 25 107
The case of the missing ballots (ed) ... May 23 101
Computer designs major components of machine tools (MR) ... June 20 4
Device works like radar to tip off tool position (MR) ... Nov. 7 3
Diemakers build machines too. Rupert Le Grand ... July 4 70
Estimating with a computer. Charles Emerson ... Nov. 21 115
The 'far out' processes get a going over-laser interferometry. R.L. Hatschek ... Nov. 21 108
Fast ways to change work. B.C. Brosheer (report) 3. Standard and special devices for gripping workpieces for machining ... Apr. 11-137-152
First quarter set records (T) ... Apr. 11 47
Flip a switch for either NC or tracer control (MR) ... Oct. 10 3
Fluidic device has liquid-bead storage element (MR) ... Nov. 7 3
Fluidics – a fast comer in machine control ... May 23 105
French machine tool show (T) ... May 9 43
Getting started with NC (report) (charts & tables) ... Nov. 7-147-162
Planning. R.H. Cowan ... Nov. 7 148
Selection. H. Van Parys ... Nov. 7 155
Installation. R.P. Risch ... Nov. 7 158
Paperwork. C.F. Brown ... Nov. 7 161
Great Britain – 62% of machine tools are at least 10 years old (T) ... Aug. 15 29
Holding down a machine tool. J.A. Waller (PI) ... Dec. 5 163
How IBM presets NC tooling. G.R. Nelson ... Apr. 25 97
How they view the year ahead (T) ... Jan. 17 41
How to cure a cry-baby (ed) ... Mar. 14 119
How to select power squaring shears. Rupert Le Grand (report) (table) ... May 23-117-132
Imports nearly double (T) ... Dec. 19 39
An industry built on change (ed) ... May 9 95
Japan's Third International Machine Tool Show: Three rings for Osaka. Anderson Ashburn ... Nov. 7 135
A look at 'fluidic' machine controls. B.C. Brosheer & Hatschek ... Apr. 11 134
Machining the complex part ... Sept. 12 107
1. Automating for low volume. Brosheer ... Sept. 12 108
2. Automating for high volume. Charles Emerson ... Sept. 12 111
Making NC buy itself. George DeGroat ... Nov. 7 133
NMTBA: machine tool orders and shipments (charts) Jan. 3-59, Feb. 14-79, Mar. 14-123, Apr. 11-125, May 9-101, June 6-37, July 4-65, Sept. 12-114, Nov. 7-134 ... Dec. 5 134
Needed: reliable machinability data. Norman Zlatin (chart) ... Sept. 26 109
New fractional-hp control system is applied to tools (MR) ... Dec. 19 4
New JIC electrical standards developing (T) ... Apr. 25 35
1965's best performers (T) ... Mar. 28 41
1966 orders up 35%, shipments up 16% (T) ... Dec. 5 39
1966 outlook – NMTBA: net new orders and shipments (charts & tables) (report) ... Jan. 17 102
1966 outlook – world machine tool production and trade (chart & table) (report) ... Jan. 17 104
1966 Tool Show
List of exhibitors ... Apr. 11-155-160
Technical program ... Apr. 11 161
Tool Show in print ... Apr. 11 162
1966 Tool Show Report ... May 9 104
Open letter (ed) ... Aug. 15 99
Order increase of 5 to 10% for 1966 (T) ... Jan. 3 31
Output – what is machine tool output? (T) ... Jan. 17 41
PCQ: new machine ratings (chart) ... Mar. 14 135
Practical use of machinability data. H.R. Soderstrom (Ref. Bk. Sheets) ... May 9 129
Press tool produces shaft with ring groove. C. McLaughlin (PI) ... Jan. 31 85
Red Bloc machine tools at Leipzig. David Scott ... Apr. 11 132
Red China aims at Afro-Asian market – Hong Kong exhibition. W.K. Jackson ... Oct. 24 126
Reds eye world tool market. Howard Rausch ... Dec. 5 130
Screw drift eases cutters out of fixed position. E. Goulet (PI) ... Jan. 31 86
7% tax credit – Johnson mothballs bill ... Sept. 26 115
The shortest memory in the world (ed) ... Jan. 31 61
62% of Britain's machine tools over-age (charts) ... Sept. 26 114
Sockets for power wrenches. J.R. Haynes (Ref. Bk. Sheet) ... July 4 101
Specials 'built' by computer. James Sandford (tables) ... Sept. 12 115
To dream the impossible dream (ed) ... Oct. 10 119
Tool for odd-shaped shell. M. Goldstein (PI) ... Jan. 31 85
Tools rebuilt to space specs ... Dec. 19 92
Tricks with tool attachments. Bernard Michels ... Jan. 17 82
Tube Investments Ltd. offers to purchase Charles Churchill Group ... Feb. 28 74
Turning with ceramic tools (Ref. Bk. Sheet) (table) ... July 4 99
An unexpected fringe benefit (ed) ... Nov. 7 131
The unexpected scramble (ed) ... Dec. 5 123
US machine tools draw 15,000 in Mexico. ... Aug. 29 78
Videotape aids tool rebuilding ... Dec. 5 146
'We cut back on machine testing . . .' Al Barr ... Feb. 14 75
Westinghouse Forum – machine tool year predictions. R.L. Hatschek ... June 20 122

Machinery
Army's do-it-yourself specials. Syndey Glossop ... June 20 136
Delivery time for machinery lengthens (table) ... May 23 116
1966 outlook – Forecast: new orders for machinery (charts) (report) ... Jan. 17 107
1966 outlook – Index of metalworking production (charts) (report) ... Jan. 17 109
Orders for '66 to top '65 by 8% (table) ... July 4 73
Orders to be up 23% over '65 (table) ... Sept. 12 120
Orders to go 17% over '65 (table) ... Dec. 5 138
Practical use of machinability data. H.R. Soderstrom (Ref. Bk. Sheets) ... May 9 129
Red China aims at Afro-Asian market – Hong Kong exhibition. W.K. Jackson ... Oct. 24 126

Magnesium
Lithium alloys, 1966 outlook – Technical: material (report) ... Jan. 17 118
Wing bending methods. E.P. Schneider (Ref. Bk. Sheets) ... June 6 143

Magnetic Equipment
Magnet shunts metal flakes. D.F. Kimberling (PI) ... July 4 105
Magnetic belts handle long, thin core laminations (MR) ... Dec. 19 4

Maintenance
Bolt and stud remover. J. Parker (PI) ... Jan. 3 93
Carbide-tool breakage. V.G. Yost (Ref. Bk. Sheets) ... Apr. 25 107
Hard surfacing repairs worn, damaged tools (MR) ... Jan. 17 4
'Instant history' slashes repair costs. William Daly ... Dec. 19 96
Insulation technique speeds motor rewind (MR) ... July 4 4
Ladder diagrams are applied to oil, air systems (MR) ... Mar. 28 4
Plexiglas protects optics. N. Bradley (PI) ... May 9 138
Tandem carbide inserts cut replacement costs. E. Goulet (PI) ... May 9 138
Videotape aids tool rebuilding ... Dec. 5 146

Management
The AM Award: Donald C. Burnham (cover) Dec. 19-1, ... Dec. 19 98
Computer takes on new jobs in the auto industry. Charles Emerson ... Jan. 3 55
Not enough are running ... Dec. 19 83
NC is management's baby – Lockheed-Georgia. James Sandford ... Sept. 26 106
The price of harmony (ed) ... July 18 99
Regenerative shop planning. R.B. Scott (report) (tables) ... Mar. 28-89-94
Three roads to reliability
1. QC: its new implications. Dr. N.L. Enrick ... Jan. 31 63
2. Make 'Zero Defects' a way of life. Philip Crosby ... Jan. 31 64
3. How about standards for standards? H.J. Mote ... Jan. 31 65
Tube Investments offers to purchase Charles Churchill Group ... Feb. 28 74

Mandrels
Expanding-type mandrel. C. McLaughlin (PI) ... Aug. 15 129
Fast ways to change work. B.C. Brosheer (report) 3. Standard and special devices for gripping workpieces for machining ... Apr. 11-137-152
Washer workpieces split on special mandrel. F. Rush (PI) ... Apr. 25 115

Materials Handling
Getting parts to machines fast – work-in-process warehouse next to the shop. J.K. Berthhold ... Aug. 29 68
Nesting drums hatch savings – steel containers, shipped in pieces and assembled by the user. Fran Ridgway ... Aug. 15 115
New design for machine-tool chip conveyor (MR) ... Dec. 19 3
1966 outlook – Technical: materials handling (report) ... Jan. 17 113

Measuring
B&L measurer has scale calibration to 0.001 mm (MR) ... Apr. 11 3
The barrier of Babel (ed) ... Aug. 29 63
British-developed instruments: electron microscope and surface-texture recorder (MR) ... June 6 3
Center lines drawn quickly. J. Schmidt (PI) ... Sept. 26 136
Cut-away steel scale. A. Pippi (PI) ... Apr. 11 252
Expanded micrometer face gages rubber surfaces. E.J. Goulet (PI) ... Nov. 21 145

(ed) Editorial. (MR) Metalworking Report. (PI) Practical Ideas. (T) Trends.

How to measure flatness. J.K. Emery (report) (table) ... Aug. 29-79-86
Mobile-Q-Labs – quality control takes to the road ... Jan. 17 79
Needed: reliable machinability data. Norman Zlatin (chart) ... Sept. 26 109
1966 Tool Show Report ... May 9 104
Optical flats check the flatness of parts under monochromatic light (cover) ... Aug. 29 1
Repeatability to 0.2 millionth! – New measuring technique, involving a fiber-optic probe. W.R. Moore ... Aug. 29 65
Short cut method measures shaft rpm. E. Jones (PI) ... Oct. 24 162
Simple vee measures three-flute drills. E. Goulet (PI) ... June 20 156
'So we switched to the decimal inch . . . Frank Zagar ... Nov. 7 140
Why a measuring machine? L.R. Ormston ... Sept. 26 122
X-rays give assist in measuring plating thickness (MR) ... June 20 3

Metal Spraying
Electric-arc metal spray gun (cover) ... Jan. 31 1
Electrostatic hand gun handles two spraying jobs (MR) ... Feb. 28 4
Organic coating has long life, high resistance (MR) ... Sept. 12 4
Spraying metal by electric arc. Joe Rosenbery ... Jan. 31 66
Water cuts the cost of coating ... Sept. 26 111

Mexico
Manpower around the world. Bruce Cross ... July 18 126
RR car production boost ... Feb. 28 92

Milling
Computer controls NC milling machine via telephone link (MR) ... Aug. 29 3
Damping device kills vibration during milling (MR) ... July 18 4
Dial M for mechanization at Eastman Kodak's Camera Works ... Sept. 26 103
Faster way to contour mill jet engine cases. Rupert Le Grand ... Mar. 28 72
'Fluidics' replace electric controls on mills at BAS (MR) ... Apr. 11 4
Horizontal miller spots work. E.J. Goulet (PI) ... Dec. 19 124
How to figure milling times. McFalls & Munson (charts & tables) (report) ... Jan. 3-69-84
How to machine a giant. H.A. Squires ... Mar. 14 132
Jet-engine rings are contour-milled on a tracer-controlled rotary milling machine (cover) ... Mar. 28 1
Job shop for NASA space vehicles ... Feb. 14 82
Lathe mills square shanks. C. McLaughlin (PI) ... July 18 139
Milling machine column tilts on pedestal pivot (MR) ... Nov. 21 4
Milling machine cuts generator-winding slots in turbine-generator rotor (cover) ... Sept. 26 1
Multiple setups speed output. B.C. Brosheer ... May 9 111
A new look at stainless. S.E. Tyson (report) (charts & tables) ... May 9-115-126
NC at Ford. Emerson & Hatschek ... Jan. 17 90
NC horizontal boring mill machines aerospace components weighing as much as 10 tons (cover) ... Feb. 14 1
NC mill puts complex hole pattern in a stack of blanks, a job normally handled on a press (cover) ... Aug. 15 1
NC retrofit speeds Apollo production ... Apr. 11 131
Point-to-point NC machines can angle mill (MR) ... Nov. 21 3
Precision spacing system for gang milling. W. Keller (PI) ... Apr. 11 251
The push for NC die milling ... Jan. 17 89
Quick-acting milling fixture. F. Strasser (PI) ... Jan. 17 140
Quick pointers on tooling. A.T. Pippi (PI) ... Aug. 29 91
Quick way to gage depth when milling keyways. R.R. Geib (PI) ... July 4 106
Recessing tool cuts job time 75% ... Aug. 15 118
Saturn rocket booster – milling boosts lunar payload. Nansen & Albert ... Feb. 28 71
Setup to cut off and mill flat. C. McLaughlin (PI) ... Jan. 3 93
75-hp horizontal-bar mill drills, bores, and mills a 57-ton weldment for an earthmover (cover) ... Mar. 14 1
The versatile adaptive control. Reynolds & Norwood ... May 23 103

Modernization
The AM Award: Donald C. Burnham (cover) Dec. 19-1 ... Dec. 19 98
NC puts punch in a punch for RR hopper cars ... Oct. 10 126
The push for modernization (tables) ... Dec. 5 128

Molds (see **Forming**)

Molybdenum
Electrolytic coating to protect molybdenum (MR) ... Mar. 28 4
GE does it: die-casts ferrous metals ... May 23 111
1966 outlook – Technical: materials (report) ... Jan. 17 118

Motors
Air motor speeds NC drill spindle (MR) ... Oct. 10 3
Dual-function electric motor for NC positioning (MR) ... June 20 3
Industry's first complete family of high-voltage motor starters (T) ... Oct. 10 21
Insulation technique speeds motor rewind (MR) ... July 4 4
Low-inertia DC servomotors. R.L. Hatschek ... Nov. 21 108
Resin system speeds motor insulation ... July 18 105
Threader eliminates 'wobble' in rotors. L.H. Deubler ... Aug. 1 107

N

National Machine Tool Builders Association
DeWolf, A.J. – ViPortrait ... Nov. 7 138
Machine tool orders and shipments (charts) Jan. 3-59, Feb. 14-79, Mar. 14-125, Apr. 11-125, May 9-101, June 6-37, July 4-65, Sept. 12-114, Nov. 7-134, Dec. 5 134
'New Look' at Machine Tool Builders' (T) ... May 9 39
New NMTBA officers, 1966-67 ... Nov. 21 149
1966 outlook: net new orders and shipments (charts & tables) (report) ... Jan. 17 102
Second survey of 22 companies measures shortage of manpower (T) ... Jan. 31 37
To add to training programs (T) ... Mar. 14 41
The training explosion report
Job Entry Training – the JET program ... June 6 114
How to get funds for training ... June 6 119

National Tool, Die & Precision Machining Association – The training explosion report – How to get funds for training ... June 6 119

Nickel
Alloy for cryogenic jobs (T) ... Apr. 25 37
Hot-rolled steel gets diffusion-bonded nickel coat (MR) ... Dec. 5 4
NASA develops new superalloy family (T) ... Aug. 1 43
New nickel-base alloys coming (T) ... July 4 43
Nickel bond joins layers of refractories (MR) ... Feb. 28 4
Nickel coat is simply bonded to steel sheet (MR) ... Nov. 7 3
Picatinny Arsenal 'silent room' – drilling by ear. Joseph Kuletz ... July 4 63
Plated nickel shapes up. James Sandford ... Oct. 10 125
Stellite markets porous metal sheet (T) ... June 20 41
Tapping an 'impossible' steel. R.A. Kirschbaum ... Nov. 21 107

Noise – Picatinny Arsenal 'silent room' – Drilling by ear. Joseph Kuletz ... July 4 63

Numerical Control
Adaptive controls operate a numerically controlled spotwelder (T) ... Feb. 14 19
'Adaptive spotwelding' – Adaptive control and numerical control teamed up at Boeing. A.M. Sciaky ... Dec. 19 85
Air motor speeds NC drill spindle (MR) ... Oct. 10 3
All-NC show bows at Olympia. R.L. Hatschek ... May 23 106
Already, a step beyond adaptive controls? – Aerospace manufacturers want to add process control to the working of exotic materials ... Oct. 24 121
The Army rediscovers NC. B.C. Brosheer (tables) ... Mar. 28 65
Auto dies by computer – AUTOSURF computer program. Jack Star ... Nov. 21 112
'Bugs' shrink contouring NC ... Aug. 29 77
The case of the missing ballots (ed) ... May 23 101
Computer controls NC milling machine via telephone link (MR) ... Aug. 29 3
Contouring on point-to-point NC. George DeGroat ... Aug. 15 110
Contouring with point-to-point NC machines (MR) ... Feb. 14 3
Dual-function electric motor for NC positioning (MR) ... June 20 3
East-West team up on NC lathe. J.R. Mikton ... May 23 109
ECM teams up with NC to solve problem at Xerox ... June 20 128
Flexible chain boosts toolchanger storage capacity (MR) ... Feb. 14 4
Flip a switch for either NC or tracer control (MR) ... Oct. 10 3
Gas tungsten-arc welding being done on continuous-path NC machine. Stoeckinger & Littlefield ... Aug. 1 95
Getting started with NC (report) (charts & tables) ... Nov. 7-147-162
Planning. R.H. Cowan ... Nov. 7 148
Selection. H. Van Parys ... Nov. 7 155
Installation. R.P. Risch ... Nov. 7 158
Paperwork. C.F. Brown ... Nov. 7 161
How IBM presets NC tooling. G.R. Nelson ... Apr. 25 97
Integrated circuits incorporated in three-axis contouring NC system (T) ... Jan. 31 17
Job shop for NASA space vehicles ... Feb. 14 82
'Job shop' for NC tapes. George DeGroat ... Jan. 31 70
Low-cost NC contouring. James Sandford (chart) ... Apr. 25 83
Machining center adapted for NC gun drilling (MR) ... Feb. 28 4
Making NC buy itself. George DeGroat ... Nov. 7 133
Material and tooling data for NC (T) ... July 18 39
Modifications on NC turning machine improve precision (MR) ... Nov. 7 4
Needed: reliable machinability data. Norman Zlatin (chart) ... Sept. 26 109
The new Army game (ed) ... Mar. 28 63
1966 outlook – Technical: numerical control (report) ... Jan. 17 111
1966 Tool Show Report ... May 9 104
NC arc welder tackles the tough jobs (MR) ... July 18 3
NC at Ford. Emerson & Hatschek ... Jan. 17 90
NC cuts short-run 'stampings'. C.C. Treff ... Aug. 15 101
NC device reduces gearhobbing errors (MR) ... July 4 3
NC drilling beyond normal table range. C. Brown (PI) ... Jan. 17 139
NC for stretch dies, closer tolerances for aircraft sheet metal parts. Max Lofton ... Aug. 15 108
NC grinder cuts auto cams. Yasumasa Ishihara ... Sept. 26 112
NC grinder cuts camshaft leadtime (MR) ... July 18 3
NC horizontal boring mill machines aerospace components weighing as much as 10 tons (cover) ... Feb. 14 1
NC is management's baby – Lockheed-Georgia. James Sandford ... Sept. 26 106
NC machining center mills bearing cap seat of V-8 block in low-volume production (cover) ... Sept. 12 1
NC machining cuts short-run 'stamping' costs (MR) ... Aug. 1 4
NC mill puts complex hole pattern in a stack of blanks, a job normally handled on a press (cover) ... Aug. 15 1
NC offered with EIA RS-244 code plus ASCII option (MR) ... Mar. 14 3
NC program drills first on 'tap' command (MR) ... May 23 3
NC puts punch in a punch for RR hopper cars ... Oct. 10 126
NC retrofit speeds Apollo production ... Apr. 11 131
NC takes a look at itself – Numerical Control Society's third annual meeting. R.L. Hatschek ... Apr. 25 96
NC takes on 'non-NC' jobs. E.C. Brown Jr. ... Aug. 15 116
NC tube bender is being developed for multi-bends (MR) ... July 18 4
Photo below symbolizes the first step in applying numerical control to manufacturing (cover) ... Nov. 7 1
Point-to-point NC machines can angle mill (MR) ... Nov. 21 3
'Pony' speeds tape training. C.F. Brown ... Apr. 25 94
The push for NC die milling ... Jan. 17 89
Question what is or is not an NC job (MR) ... Aug. 15 3
Shop faser checks NC positioning accuracy at Lockheed – Georgia. James Sandford ... Nov. 21 118
Spark-discharge machine has NC for microengraving (MR) ... May 23 4
Specials 'built' by computer. James Sandford (tables) ... Sept. 12 115
Tandem NC pays off fast at John Deere Waterloo Tractor Works. Ebhington & Euchner ... Feb. 28 81
3-D coordinates located direct from clay models (MR) ... Jan. 31 4
Time recorders check on NC. Harry Nensching (table) ... July 18 109
The training explosion report – Training for numerical control ... June 6 141
Triple play on an NC machine. B.C. Brosheer ... Sept. 26 126
Turning to microinches ... Nov. 7 145
Two quartets of spindles guided by tape (MR) ... Mar. 28 3
Two tape readers save programming time on NC punch (MR) ... Oct. 24 3
An unexpected fringe benefit (ed) ... Nov. 7 131
UN symposium in Moscow (T) ... Sept. 26 37
Update on welding – NC positioning for airframe spotwelding ... Feb. 28 80

(ed) Editorial. (MR) Metalworking Report. (PI) Practical Ideas. (T) Trends.

Welder combines adaptive control, tape positioning (MR) — Oct. 24 3
Westec show -- NC again in the spotlight — Mar. 28 76
Westinghouse Forum reports new NC system and EIA NC standards. R.L. Hatschek — June 20 122
Whither NC? Asks DOD. R.L. Hatschek — Oct. 24 125
Who's afraid of numerical control? (ed) — Apr. 25 81

Numerical Control Society -- Third annual meeting -- NC takes a look at itself. R.L. Hatschek — Apr. 25 96

Nuts
Split nut protects threads in second operation setup. F.L. Rush (PI) — July 18 139
T-slot nuts won't bind. D.F. Kimberling (PI) — Dec. 5 164

O

Ordnance Manufacturing
The Army rediscovers NC. B.C. Brosheer (tables) — Mar. 28 65
A guide to heat treating from Winchester Western. R.L. Suffredini (charts) — July 18 111
HERF bangs out long extrusions for Snakeye bomb retarders — July 18 115
Navy's Mark 16 torpedo -- How to 'butter up' a weld — Aug. 1 98
Snakeye production -- keeping the Snakeyes rolling. Ranill & DeGroat — Aug. 1 108
Time recorders check on NC. Harry Mensching (table) — July 18 109

Oxide Tools (see Ceramics)

P

Painting
Electrostatic hand gun handles two spraying jobs (MR) — Feb. 28 4
Fabricating zinc-coated steel. Roger Gardner (tables) — Feb. 14 83
Olive-green, heat-reflecting paint (MR) — Sept. 12 4
Precoated steels. C.M. Parker (report) (table) — Sept. 12-129-136
Space-age paint -- aluminum melts while its paint coating is intact (MR) — May 23 4

Parallels -- Parallel plate for lathe chuck. H. Koslow (PI) — Dec. 5 164

Photography
Fine-grooving for 3-D prints. B.C. Brosheer — Oct. 24 119
Press-O-Film on surface gives 3-D replica (MR) — Nov. 7 4

Plastics
ASME winter meeting highlights — Dec. 19 91
Epoxy blanket protects part for explosive forming (MR) — May 23 4
Fine-grooving for 3-D prints. B.C. Brosheer — Oct. 24 119
Glass-reinforced thermoplastic resists 465 F (MR) — June 6 3
Molding a 10-foot plastic ball -- Air Force's new space flight simulator. A.M. Guerreiro — Mar. 14 128
1966 outlook -- Technical: materials (report) — Jan. 17 119
Organic coating has long life, high resistance (MR) — Sept. 12 4
Plastic cap resists fire and shock in explosive forming (MR) — Mar. 28 4
Plastics coming on strong (T) — Feb. 14 35
Plexiglas protects optics. N. Bradley (PI) — May 9 138
Polyimide bond improves diamond grinding wheel (MR) — Oct. 10 3
Precision grooving operation on a brass roll is the key to producing the embossed plastic sheet for this three-dimensional photograph (cover) — Oct. 24 1
Precoated steels. C.M. Parker (report) (table) — Sept. 12-129-136
Reinforce plastic with wires instead of glass fibers (MR) — Feb. 28 4
Resin system speeds motor insulation — July 18 105
Self-lubricating plastic seal eliminates hone (MR) — Nov. 7 3
'Space-age' plastics to rival the metals. (MR) — Oct. 10 3
Spray-on material provides mask for electro-coating (MR) — July 4 4
Thermoplastic polyimide can be shaped by molding (MR) — July 4 3
Urethane die gets 'workhorse' role. C.H. Becker — Jan. 31 72

Plating
Aluminum is copper plated by phosphate anodizing (MR) — June 6 4
A bright acid plating system for tin (MR) — July 4 4
Chemical ion plating for heat-sensitive parts (MR) — Dec. 5 3
Chipless claim for tools plated with tungsten carbide (MR) — Aug. 1 4
Dual power is key to hard-chrome plating technique. Hans Hausner — Apr. 25 102
Electroplating chromium directly onto aluminum (T) — Feb. 14 19
Electroplating gives black chrome for auto parts (MR) — Dec. 19 4
Gold plating costs come down. J.E. Sandford (table) — Jan. 3 62
Hard-chrome plating method has dual power (MR) — Apr. 25 4
Hollow spherical rotors assembled by electroplating (MR) — Sept. 26 3
How black is black chrome? — Dec. 19 88
Neutral zinc-plating solution is applied direct (MR) — Aug. 15 4
Plated nickel shapes up. James Sandford — Oct. 10 125
Plating with diamonds. Kenneth Gillis — May 9 102
Process for plating tools with diamond grit (MR) — Feb. 28 4
Solution prevents water-staining after plating (MR) — Dec. 19 3
Surface treatment for cutting tools (Ref. Bk. Sheet) — May 23 135
To remove crust -- heat, not hammer, plating-bath coils (MR) — Apr. 11 4

Polishing
Fast polish for stainless sheet. James Sandford — July 18 130
Metal polisher uses stroke-sanding method (MR) — June 6 3

Positioners
Collet device positions work. R. Hill (PI) — June 6 152
Device works like radar to tip off tool position (MR) — Nov. 7 3
Dual-function electric motor for NC positioning (MR) — June 20 3
Shop laser checks NC positioning accuracy at Lockheed-Georgia. James Sandford — Nov. 21 118
Tongued plate holds level for shaft positioning. F. Rush (PI) — Jan. 17 140
Tool block improvements. P.T. Hennig (PI) — June 6 151
Triple play on an NC machine. B.C. Brosheer — Sept. 26 126

Powder Metals
Aluminum powder sheet on the way (T) — June 6 41
1966 outlook -- Technical: materials (report) — Jan. 17 119
Powdered metal and ceramic mixed for reinforcing fiber (MR) — Nov. 21 4
Shotgun approach to P/M parts (T) — Feb. 28 33
What's new in powder metallurgy. George DeGroat (report) (table) — Oct. 24-135-154

Press Brakes
Light carpets makes safer press brakes (MR) — Aug. 29 3
Portable shearing attachments lets press brake shear (MR) — May 23 4
Press-brake bends. M.J. Mess (Ref. Bk. Sheet) — Nov. 7 167
Tonnage chart for various bend angles. R.F. Dehn (Ref. Bk. Sheet) (chart) — Apr. 11 247
Tonnage for air bends, 1 & 2. R.F. Dehn (Ref. Bk. Sheets) (chart) — Mar. 28 97
Tonnage vs stroke of press brakes. R.F. Dehn (Ref. Bk. Sheet) (chart) — Apr. 11 245
Urethane die gets 'workhorse' role. C.H. Becker — Jan. 31 72

Pressworking
Air-electric control for dies. M.J. Goldstein — Feb. 28 86
Angle iron supports work. F.L. Rush (PI) — Sept. 12 148
Chart shows pressure for press working. R.J. Phillip (PI) — Dec. 19 123
Clutchless press stops accurately at high speeds (MR) — May 23 3
Controls on Ford's presses have new safety features — Mar. 28 149
Diemaker turns parts maker -- Carbidex — Dec. 5 125
Flexopresses have reduced height, deeper crowns (MR) — Dec. 19 3
Hot presses bond skin to helicopter blades — Apr. 25 100
Hydraulic 'press pacer' works at top speed (MR) — Oct. 24 3
Interchangeable cams increase press speed (MR) — Oct. 10 4
1966 outlook -- Technical: forming (report) — Jan. 17 115
Output is doubled with nine-station draw press (MR) — Jan. 3 4
Press curbs offset loads. J. Schmidt (PI) — Oct. 10 164
Press tool produces shaft with ring groove. C. McLaughlin (PI) — Jan. 31 85
Press tool rolls rings with urethane. H. Koslow (PI) — Apr. 11 251
Punch press handles oversize blanks. R.J. Phillip (PI) — Aug. 15 130
Stripper speeds press setup. R. Phillips (PI) — Mar. 28 108
Stud press holds rockers in car engines (MR) — Apr. 25 4
300 cans a minute! Rupert Le Grand — June 20 126
Tooling a fourslide, 9. C.J. Labonack — May 9 108
USI going into press feeding equipment business (T) — Apr. 11 29
Volkswagen adding new tooling for its larger 1500/1600's. Charles Emerson — July 4 74
What's new in powder metallurgy. George DeGroat (report) (table) — Oct. 24-135-154

Prices
1966 outlook -- index of metalworking prices (charts) (report) — Jan. 17 108
1966 outlook -- what's happening to wages and prices (table) (report) — Jan. 17 106
The Quaker and the Quill (ed) — Jan. 17 75
Tighter labor market looms — Mar. 28 87
...how will this affect wages and prices? — Mar. 28 88

Printing -- Fine-grooving for 3-D prints. B.C. Brosheer — Oct. 24 119

Production Control
Advanced remote control for engine block work (MR) — Sept. 12 4
Army's do-it-yourself specials. Sydney Glassop — June 20 136
Assembly banks pay high dividends (charts) — Sept. 26 121
Bell Helicopter's 'diagramatic planning': Helicopters in a hurry. Marvin Reid — Dec. 19 94
Blanking line cuts setup time — Mar. 14 124
Brazil -- Manpower Around the World. Wes Perry — June 20 142
British introduce two new high-speed counting devices (MR) — Mar. 28 4
Bronze water-meter cases are finish machined by one man in a multi-machine work center (cover) — July 18 1
Building batteries for space at Lockheed. W.J. Conner — Mar. 14 121
Computer takes on new jobs in the auto industry. Charles Emerson — Jan. 3 55
Dial M for mechanization at Eastman Kodak's Camera Works — Sept. 26 103
DOD sweats out lengthening lead times — Nov. 21 120
Earthmoving equipment -- how to machine a giant. H.A. Squires — Mar. 14 132
Fast ways to change work. B.C. Brosheer (report) 3. Standard and special devices for gripping workpieces for machining — Apr. 11-137-152
Fluidics -- a fast comer in machine control — May 23 105
Gemini spacecraft -- fingertips move weld fixtures at McDonnell Aircraft. Dubuisker & Robertson — May 9 97
GM's new piston line jumps output 50%. J.E. Sandford — Jan. 17 84
How IBM presets NC tooling. G.R. Nelson — Apr. 25 97
How to skeletonize products -- working with steel wire — Apr. 25 90
Keep production flowing with master production order. A.T. Eyman — Oct. 24 127
Ladder diagrams are applied to oil, air systems (MR) — Mar. 28 4
Machinability tests: a critique. G.B. Troup (charts & table) — Apr. 11 127
Machining the complex part — Sept. 12 107
1. Automating for low volume. B.C. Brosheer — Sept. 12 111
2. Automating for high volume. Charles Emerson — Sept. 12 111
Mexico boosts RR car production — Feb. 28 92
Multiple setups speed output. B.C. Brosheer — May 9 111
1966 outlook -- Technical: manufacturing control (report) — Jan. 17 113
Oldsmobile -- tooling up the Toronado. Charles Emerson — June 20 123

(ed) Editorial. (MR) Metalworking Report. (PI) Practical Ideas. (T) Trends.

PCQ: new machine ratings (chart) ..... Mar. 14 135
Packaged production service for U.S. manufacturers wanting production facilities in the United Kingdom (T) ... June 6 19
Practical use of machinability data. H.R. Soderstrom (Ref. Bk. Sheets) ..... May 9 129
Press control problem solved with fluidics (MR) ..... Apr. 25 3
Product failures used to predict life of part lot (MR) ..... Jan. 31 4
Recessing tool cuts job time 75% ..... Aug. 15 118
Regenerative shop planning. R.B. Scott (report) (tables) ..... Mar. 28 89-94
Retooling for nuclear power – at GE's LST – G. Harry Mote ..... Sept. 26 116
Scheduling with a computer. Rupert Le Grand ..... Oct. 10 121
Snakeye production – keeping the Snakeyes rolling. Ranill A. DeGreat ..... Aug. 1 108
'So we switched to the decimal inch . . .' Frank Zagar ..... Nov. 7 140
Stored program control monitors transfer line (MR) ..... Jan. 17 3
Tandem NC pays off fast for John Deere & Co. Ethington & Euchner ..... Feb. 28 81
Three roads to reliability
1. QC: its new implications. Dr. N.L. Enrick ..... Jan. 31 63
2. Make 'Zero Defects' a way of life. Philip Crosby ..... Jan. 31 64
3. How about standards for standards? H.J. Mote ..... Jan. 31 65
Time recorders check on NC. Harry Mensching (table) ..... July 18 109
Tracing takes on a new job. George DeGreat ..... June 20 117
The versatile adaptive control. Reynolds & Norwood ..... May 23 103
Volkswagen adding new tooling for its larger 1500/1600's. Charles Emerson .. July 4 74
'We cut back on machine testing . . .' Al Barr ..... Feb. 14 75
Work centers tackle big jobs for Rockwell Manufacturing plant at Uniontown, Pa. W.E. Ramsden ..... July 18 106
Working tube on a fourslide. E.V. Cavagnero (table) ..... Sept. 12 121

Production Control (see also **Management**)

Pumps – Coaxial laser 'pump' (MR) ..... Mar. 14 3

Punches
Bulging with a spring punch. M.J. Goldstein ..... Mar. 28 77
Center punch for accurate work. J. Schmidt (PI) ..... Dec. 5 163
A computer picks a machine. J.W. Schaefer (tables) ..... Aug. 1 93
Double cam slide boosts punch travel ..... Dec. 5 138
Drill substitutes for transfer punch. F. Fehely (PI) ..... Mar. 28 108
NC puts punch in a punch for RR hopper cars ..... Oct. 10 126
One step punching and forming. R.J. Phillip (PI) ..... May 23 141
Punch aligning method. F.L. Rush (PI) ... Nov. 7 173
Self-centering transfer punch. E. Jones (PI) ..... Aug. 29 92
Tiny hole punching in 0.005-in. strip (MR) ..... Aug. 1 3
Two tape readers save programming time on NC punch (MR) ..... Oct. 24 3
Z-bar aids center punch. R. Hill (PI) ..... Apr. 11 252

Punches (see also **Dies**)

Purchasing
Delivery time for machinery lengthens (table) ..... May 23 116
DOD sweats out lengthening lead times .. Nov. 21 120
Pentagon eases rules (T) ..... Mar. 28 33

Q

Quality Control
Computer takes on new jobs in the auto industry. Charles Emerson ..... Jan. 3 55
Device detects cutting heat, cues for cooling fluid (MR) ..... Nov. 21 4
How IBM presets NC tooling. G.R. Nelson ..... Apr. 25 97
Mobile-Q-Labs – quality control takes to the road ..... Jan. 17 79
Needed: reliable machinability data. Norman Zlatin (chart) ..... Sept. 26 109
1966 outlook – Technical: inspection and testing – ZD (report) ..... Jan. 17 122
Putting accuracy into EDM. James Sandford ..... Nov. 7 141
Readout/printout device documents quality control (MR) ..... Aug. 1 3
Three roads to reliability
1. QC: its new implications. Dr. N.L. Enrick ..... Jan. 31 63
2. Make 'Zero Defects' a way of life. Philip Crosby ..... Jan. 31 64
3. How about standards for standards? H.J. Mote ..... Jan. 31 65

Quenching (see **Heat Treatment**)

R

Radiography (see **X-Rays**)

Railroads
Assembly of railroad hopper cars has been boosted 50% by modernized methods (cover) ..... Oct. 10 1
Forg.. urns out railroad axles automatically (MR) ..... Sept. 12 4
Mexico boosts RR car production ..... Feb. 28 92
NC puts punch in a punch for RR hopper cars ..... Oct. 10 126

Reaming
Hand reaming jig. F.L. Rush (PI) ..... June 6 151
A new look at stainless. S.E. Tyson (report) (charts & tables) ..... May 9 115-126
Reamer fixture saves time. D. Kimberling (PI) ..... June 20 156
Spring and collar assists reaming. R.L. Rush (PI) ..... Dec. 19 124

Records
'Instant history' slashes repair costs. William Daly ..... Dec. 19 96
Time recorders check on NC. Harry Mensching (table) ..... July 18 109

Reference Book Sheets – Jan. 3-87, Jan. 17-129, Jan. 31-77, Feb. 14-99, Feb. 28-101, Mar. 14-151, Mar. 28-97, Apr. 11-245, 247, Apr. 25-107, May 9-129, May 23-135, 137, June 6-143, June 20-149, 151 July 4-99, July 4-101, July 18 -133, 135, Aug. 1-111, 113, Aug. 29-87, 89, Sept. 12-137, Sept. 26-127, 129, Oct. 10-155, 157, Nov. 7-167- 169, Nov. 21-139, Dec. 5-157, ... Dec. 19 119

Research
Forging today. F.E. Chepko (report) (chart) Nov.21 121-136
Fuel cells for industrial applications (T) ..... Mar. 14 25
GE to sell its materials data (MR) ..... Mar. 14 43
Jet of water at supersonic speed? New cutting tool (MR) ..... Oct. 24 4
Magnetic control for arc welding is focus of research (MR) ..... May 9 3
National Bureau of Standards gets new $120-million laboratory ..... Dec. 5 215
1966 outlook – R&D spending sets new record (chart & table) (report) ..... Jan. 17 97
R&D in hafnium and zirconium (T) ..... May 9 41

Rings
Press tool rolls rings with urethane. H. Koslow (PI) ..... Apr. 11 251
Rolled rings, 1 & 2, J.F. Beck (Ref. Bk. Sheets) (table) ..... Mar. 14 151

Roll Flowing (see **Shear Forming**)

Rolls – Titanium sheet is cross rolled for uniform thickness (MR) ..... Nov. 21 3

Russia
The other side of the coin. Anderson Ashburn (ed) ..... Oct. 24 117
Red Block machine tools at Leipzig. David Scott ..... Apr. 11 132
Reds eye world tool market. Howard Rausch ..... Dec. 5 130
USSR faces unskilled surplus. Don Winston ..... Mar. 14 126

Rust Prevention (see **Corrosion**)

S

Safety
Auto safety standards – A pendulum is to swing (ed) ..... July 4 61
Controls on Ford's presses have new safety features ..... Mar. 28 149
Danger – laser. Rex Rhein ..... June 20 119
Light carpets makes safer press brakes (MR) ..... Aug. 29 3
Safety handle for vise. F. Fehely (PI) ..... May 23 142
Safety Sentry breaks circuits before disaster (MR) ..... Apr. 11 4
A time to extend competition (ed) ..... Apr. 11 121

Salvage – Salvaging a welding rod. A. Vena (PI) ..... Feb. 14 106

Sandwich Structures (see **Honeycomb**)

Sawing
High-speed saw for dicing silicon wafers (MR) ..... May 9 4
Multiple size adapter for slotting saw work. A.T. Pippi (PI) ..... June 6 152
Novel support speeds sawing of large metal panels. A. Pippi (PI) ..... Jan. 17 140

Screw Machines (see **Turning**)

Screwdrivers – Torque screw driver speeds assembly. E. Goulet (PI) ..... Mar. 28 107

Screws
Cap screw fits misaligned holes. A. Pippi (PI) ..... Feb. 28 110
How to handle 'trapped' screws. R. Lovdahl (PI) ..... Feb. 14 106
Making transfer screws. F. Fehely (PI) ... July 18 140
Screws expand in blind holes. J. Schmidt (PI) ..... May 23 141
Self-drilling screws are formed 10 times faster (MR) ..... Sept. 26 3
Slotting special screws. H. Koslow (PI) .. July 4 106

Scribers – Divider scribes small circles. H. Koslow (PI) ..... Aug. 1 118

Sealing
'Batch process' eliminates single circuit sealing (MR) ..... Dec. 5 4
Self-lubricating plastic seal eliminates hone (MR) ..... Nov. 7 3
Valve seat pores are sealed to prevent corrosion (MR) ..... Oct. 24 4

Shaping
The case for the tailored arc ..... May 9 101
Finger triggers end of feed on tool room shaper. R. Phillip (PI) ..... July 18 140
Shaper tool produces a divided collar. C. McLaughlin (PI) ..... Feb. 28 109
'Third hand' for shaper work. R. Hill (PI) Feb. 28 110
Working tube on a fourslide. Erman V. Cavagnero (table) ..... Sept. 12 121

Shaving – Rotary cutter shaves large gears (MR) ..... Jan. 3 4

Shearing Forming
Fast, short strokes reduce shear size (MR) ..... Nov. 7 4
Forging today. F.E. Chepko (report) (charts) Nov.21 121-136
How to select power squaring shears. Rupert Le Grand (report) (table) ..... May 23 117-132
Portable shearing attachments lets press brake shear (MR) ..... May 23 4
12-foot shear cuts yellow brass (cover) ... May 23 1

Shims – Shim build up. D.F. Kimberling (PI) ..... Oct. 10 166

(ed) Editorial. (MR) Metalworking Report. (PI) Practical Ideas. (T) Trends.

Shipping (see Materials Handling)

Shop Shots – Jan. 17-81, Feb. 28-76, Mar. 28-84, May 23-112, June 10-140, July 18-116, Sept. 26-124 ... Dec. 5 142

Shrinking (see Fits)

Silver – Stellite markets porous metal sheet (T) ... June 20 41

Sine bars and tables – Sine bar built into fixture. R.R. Geib (PI) ... Oct. 24 162

Skiving
Skiving on automatics. G.T. Walsh ... Feb. 28 88
Skiving on automatics cuts costs (MR) ... Feb. 28 4

Slotting
Multiple size adapter for slotting saw work. A.T. Pippi (PI) ... June 6 152
Screw slotting tool. C. Bossman (PI) ... Feb. 28 109
Slotting special screws. H. Koslow (PI) ... July 4 106

Sodium – Electrical cables may have sodium conductors (MR) ... Jan. 17 4

Soldering
Braze plus solder makes cans ... Jan. 17 87
Fountain-pen-like soldering gun for small parts (MR) ... Aug. 15 4
Going to mechanized soldering and brazing? George Williams (table) ... Aug. 1 89
Simultaneous soldering system bonds up to seven leads at once (MR) ... June 6 3
Solder wire is cut quickly. B. Long, Jr. (PI) ... May 9 138
Soldering methods automated with pre-tinned metals (MR) ... Feb. 28 3

Special Reports
Automatic assembly: its potentials and pitfalls. Charles Emerson ... Feb. 28-93-100
Cleaning with ultrasonics. J.E. Sandford (charts & tables) ... Feb. 14-87-98
Cold extrusion. S.D. Brootzkoos (charts & tables) ... Oct. 10-135-150
Cutting with a spark. James Sandford (charts & tables) ... July 4-77-92
Fast ways to change work. B.C. Brosheer 3. Standard and special devices for gripping workpieces for machining ... Apr. 11-137-152
Forging today. F.E. Chepko (report) (chart) ... Nov. 21-121-136
Getting started with NC (report) (charts & tables) ... Nov. 7-147-162
Planning. R.H. Cowan ... Nov. 7 148
Selection. H. Van Parys ... Nov. 7 155
Installation. R.P. Risch ... Nov. 7 158
Paperwork. C.F. Brown ... Nov. 7 161
How to figure milling times. McFarlin & Munson (charts & tables) ... Jan. 3-69-84
How to measure flatness. J.K. Emery (tables) ... Aug. 29-79-86
How to select power squaring shears. Rupert Le Grand ... May 23-117-132
How to work the super 12% Cr steels. Briggs & Parker (charts & tables) ... Mar. 14-139-150
A new look at stainless. S.E. Tyson (cherts & tables) ... May 9-115-126
1966 outlook (charts & tables) ... Jan. 17-95-126
Pt. 1 Economic ... Jan. 17-95-109
Pt. 2 Technical ... Jan. 17-110-126
Precoated steels. C.W. Parker (report) (table) ... Sept 12-129-136
Regenerative shop planning. R.B. Scott (tables) ... Mar. 28-89-94
What's new in powder metallurgy. George DeGroat (report) (table) ... Oct. 24-135-154

Speeds
Compound feed geared down. R. Phillip (PI) ... Jan. 3 94
Feed vs speed for tool life, 1 & 2. (Ref. Bk. Sheets) (charts) ... Feb. 28 101
New fractional-hp control system is applied to tools (MR) ... Dec. 19 4

Springs – Spring assists tailstock moves. R. Phillips (PI) ... May 9 137

Stamping
Blanking line cuts setup time ... Mar. 14 124
Blanking strip with gages. Federico Strasser ... Feb. 14 76
Carbide dies stamp parts from 1%-silicon steel (MR) ... June 6 3
Chrysler Corp.'s stamping plant – EDM makes it big ... June 20 132
Compound die for heavy work. M.J. Goldstein ... May 23 114
A computer picks a machine. J.W. Schaefer ... Aug. 1 93
Cure for heat treat cracks. R. Jagen (PI) ... Feb. 14 106
Deep drawing. (Ref. Bk. Sheet) (tables) ... Aug. 29-87-89
Drawing thick aluminum shell. M.J. Goldstein ... Dec. 5 136
Laser pierces diamond dies for wire-drawing (MR) ... Jan. 3 3
1966 outlook – Technical: forming (report) ... Jan. 17 115
Notched blanking die saves material. H. Murro (PI) ... Jan. 3 93
NC cuts short-run 'stampings'. C.C. Treff ... Aug. 15 101
NC machining cuts short-run 'stamping' costs (MR) ... Aug. 1 4
Prehardened strip cuts cost (charts) ... July 18 118
Prehardened strip for producing steel stampings (MR) ... July 4 3
Steel die kit for short runs – Bennett die. Rupert Le Grand ... Aug. 1 104
Tooling a fourslide, 9. C.J. Labonack ... May 9 108
Trouble shooting porcelain-enameled stampings, 1 & 2, C.H. Fisher (Ref. Bk. Sheets) ... Jan. 31 77

Standardization
American Gear Manufacturers Assn has published two new standards (T) ... Dec. 19 25
Auto safety standards – A pendulum is to swing (ed) ... July 4 61
The barrier of Babel (ed) ... Aug. 29 63
The case of the missing bullets (ed) ... May 23 101
Initial ten sets of primary weight standards (T) ... Aug. 29 39
Machinability – what do standard tests really show? (MR) ... Apr. 11 4
Mobile-Q-Labs – quality control takes to the road ... Jan. 17 79
NBS's new look (T) ... July 4 29
New JIC electrical standards developing (T) ... Apr. 25 35
Proposed action on new standardization of die casting machines (T) ... Dec. 5 21
Radiographic Standards for castings (T) ... Mar. 28 43
Standard details good grinding practices (MR) ... Aug. 15 4
Thread series designations, 1 & 2 (Ref. Bk. Sheets) (tables) ... Jan. 17 129
Three roads to reliability. 3. How about standards for standards? H.J. Mote ... Jan. 31 65
USA Standards Institute has been formed to succeed the American Standards Association (T) ... Oct. 10 21
Whither NC? Asks DOD. R.L. Hatschek ... Oct. 24 125

Steel
Arc lad weld-clads stainless on top of low-alloy steel (MR) ... Sept. 12 3
Carbide dies stamp parts from 1%-silicon steel (MR) ... June 6 3
Carbide surfacing improves tool life ... Mar. 28 83
Chrome-coated strip makes a better tin can (MR) ... Sept. 12 3
Cold-finished carbon steel bars. F.E. Chepko (Ref. Bk. Sheet) ... Aug. 1 111
Cost is justified by long life of maraging steel die (MR) ... Dec. 5 4
Degassing improves tool and mold steel (T) ... Aug. 15 49
Ductile stainless to replace copper, relieve pinch (MR) ... Sept. 26 3
EDM tailored for precision. McMillan & LaBoda ... Dec. 5 144
Electrolytic etch prepares stainless for adhesive bond (MR) ... Sept. 26 4
Explosive charges cut steel strip on-the-fly ... Aug. 1 161
Fabricating zinc-coated steel. Roger Gardner (tables) ... Feb. 14 83
Fast polish for stainless sheet. James Sandford ... July 18 130
Fe-Zn coated steel is easy to weld (T) ... Sept. 26 41
Film on sintered stainless increases corrosion resistance (MR) ... Aug. 29 3
Fine grinding of huge plates. J.E. Sandford ... Mar. 28 86
Forging today. F.E. Chepko (report) (chart) ... Nov. 21-121-136
Galvanized coat affects spotwelds on sheet steel (MR) ... Sept. 26 4
GE does it: die-casts ferrous metals ... May 23 111
Gun drilling goes to great lengths ... Nov. 21 111
Heat treatment of alloy steels (Ref. Bk. Sheets) (tables) ... July 18-133-135
High-strength steel wire parts can replace castings, weldments, and cut product costs (cover) ... Apr. 25 1
Hot-rolled steel gets diffusion-bonded nickel coat (MR) ... Dec. 5 4
How to reduce hardening distortion in steel gears – Tufftriding process ... Nov. 21 114
How to skeletonize products – working with steel wire ... Apr. 25 90
How to weld dissimilar steels (table) ... Jan. 31 74
How to work the super 12% Cr steels. Briggs & Parker (report) (charts & tables) ... Mar. 14-139-150
Improved device detects pinholes in moving strip (MR) ... Aug. 15 3
Joining beryllium to stainless for a linear accelerator. W. Kudenov Jr. ... Sept. 12 118
Liquid bulge forming producing steel butt-welding tees (MR) ... Jan. 3 3
Machinability tests: a critique. G.B. Troup (charts & table) ... Apr. 11 127
Machining SS to tight tolerances ... Feb. 28 75
Navy's Mark 16 torpedo – How to 'butter up' a weld ... Aug. 1 98
New family of heat-treatable steels (T) ... Sept. 12 55
New iron alloy gives assist in welding of steel (MR) ... Oct. 10 3
A new look at stainless. S.E. Tyson (report) (charts & tables) ... May 9-15-126
New system uses steel dies for short runs (MR) ... July 18 3
Nickel plate beryllium to join it to stainless (MR) ... Jan. 31 3
1966 outlook – inventory levels signal drop in steel production (chart) (report) ... Jan. 17 100
1966 outlook – Technical: materials (report) ... Jan. 17 111
NC puts punch in a punch for RR hopper cars ... Oct. 10 126
Picatinny Arsenal 'silent room' – Drilling by ear. Joseph Kuletz ... July 4 63
Plasma gun welds stock 3/8 in. thick (MR) ... June 6 4
Precoated steels. C.W. Parker (report) (table) ... Sept 12-129-136
Prehardened strip cuts cost (charts) ... July 18 118
Prehardened strip for producing steel stampings (MR) ... July 4 3
Reinforce plastic with wires instead of glass fibers (MR) ... Feb. 28 4
Resistance welding of steel tubes. Max Osborn (Ref. Bk. Sheet) 1. Oct. 10-155-157, 2. ... Oct. 24-155-157
Rolled rings, 1 & 2. J.F. Beck (Ref. Bk. Sheets) (table) ... Mar. 14 151
Short-arc shortcuts pipe welding ... Jan. 3 65
Slide strap clamp with steel balls. R. Parmley (PI) ... June 6 152
Steel die kit for short runs – Bennett die. Rupert Le Grand ... Aug. 1 104
Steelmaking by oxygen refining, spray process (MR) ... Dec. 19 3
Steel-rule dies, 1 & 2. J.J. Raphael (Ref. Bk. Sheets) ... Jan. 3 87
Stellite markets porous metal sheet (T) ... June 20 41
Stress aging gives steel alloy ultrahigh strength ... Aug. 15 3
Tapping an 'impossible' steel. R.A. Kirschbaum ... Nov. 21 107
Technique for hand tapping hardened steel (MR) ... Nov. 21 3
Titanium oxide surface layer protects tools (MR) ... June 20 4
Tonnage for air bends, 1 & 2. R.F. Dehn (Ref. Bk. Sheets) (chart) ... Mar. 28 97
VW figures prove out cold forming ... July 18 121
Weld steel tubing for high-strength machine column (MR) ... June 6 4
Welding zinc-coated sheet ... Mar. 28 70
Wing bending methods. E.P. Schneider (Ref. Bk. Sheets) ... June 6 143

Stops
Combination tool stops and ejects workpiece. P. Hennig (PI) ... May 23 142
Rubber ring expands to hold collets. J.R. Butler (PI) ... Oct. 24 161

Storage
Chain stretches tool limit. Erich Dreschler ... Feb. 14 73
Flexible chain boosts toolchanger storage capacity (MR) ... Feb. 14 4
Getting parts to machines fast – work-in-process warehouse next to the shop. J.K. Berthold ... Aug. 29 68
Infra-red heaters control condensation and improve working conditions in metal products warehouse ... Sept. 26 105

Studs
Automatic feed gives stud welder 30-pc/min rate (MR) ... May 9 4
Combination tool stops and ejects workpiece. P. Hennig (PI) ... May 23 142
Pin adds grip to studs. N. Bradley (PI) ... Feb. 14 106

(ed) Editorial. (MR) Metalworking Report. (PI) Practical Ideas. (T) Trends.

Switches
High-powered LASS controls heavy-duty switching (MR) — Dec. 5 3
Solid-state 'threshold switches' control both ac and dc (MR) — Apr. 11 3

T

Tables – Rotary table has increased weight-carrying capacity (MR) — Jan. 3 4

Tanks (see Ordnance Manufacturing)

Tape control (see Numerical control)

Tapers – Tapering special screwdriver blades. J.A. Waller (PI) — Sept. 26 135

Tapping and Treading
Crank improves tapping in small drill press. R.J. Hill (PI) — Aug. 1 118
Disk for hand tapping. R. Wheeler (PI) — Aug. 29 92
Drillpress does tapping, too — Aug. 15 122
Machining time cut 72% by vertical driller (MR) — Mar. 14 4
Modified taps yield near-perfect threads. P. Kagan (PI) — Feb. 28 109
A new look at stainless. S.E. Tyson (report) (charts & tables) — May 9-115-126
Short cut method checks PD for special threads. R. Jagen (PI) — Aug. 1 117
Tap becomes thread chaser. H. Spinks (PI) — Jan. 3 94
Tapping an 'impossible' steel. R.A. Kirschbaum — Nov. 21 107
Tapping attachment fits drill press spindle. D. Rowland (PI) — Oct. 24 162
Technique for hand tapping hardened steel (MR) — Nov. 21 3
Thread series designations, 1 & 2. (Ref. Bk. Sheets) (tables) — Jan. 17 129
Threader eliminates 'wobble' in rotors. Louis Deubler — Aug. 1 107
Threads cut on disk face. H. Koslow (PI) — Aug. 15 130
Ultrasonics gives assist in tapping nuts (MR) — Apr. 11 4
When tapping a tough stainless steel. A.T. Pippi (PI) — Aug. 29 91

Taxation
CED urges value-added tax (T) — Apr. 25 23
How to cure a cry-baby (ed) — Mar. 14 119
Investment credit – The lesser evil (ed) — Sept. 12 105
Johnson mothballs the 7% tax credit — Sept. 26 115
U.S. corporations expect their pre-tax profits to jump 6% over last year (T) — Feb. 28 21
Value-added tax for West Germany? (T) — July 18 45

Television
TV catches machine jams, documents methods (MR) — Dec. 5 3
TV monitor of metal flaws uses ultrasonic imaging (MR) — Feb. 14 4
Videotape aids tool rebuilding — Dec. 5 146

Templets – Sensitive templet controls tracer — Jan. 3 58

Testing
ASME winter meeting highlights — Dec. 19 91
Automatic tester checks metals' drawing quality (MR) — Sept. 26 4
Big shaker can test those large assemblies — Apr. 11 301
Chrysler's turbine car tests (T) — Apr. 25 31
Fatigue cracks detected without test interruption (MR) — June 20 4
Heat regulator holds exact temperatures (MR) — July 18 4
How users evaluate diamond wheels — Feb. 14 79
Hydraulic cylinder leak test. F. Adams — Feb. 28 110
Light test for cutting fluids (MR) — Dec. 19 4
Machinability tests: a critique. G.B. Troup (charts & table) — Apr. 11 127
Machinability – what do standard tests really show? (MR) — Apr. 11 4
1966 outlook – Technical: inspection and testing (report) — Jan. 17 112
Simple gage reads compression of welded seals (MR) — Jan. 3 3
Solid, bronze-type pins and oushings outlast ball-type? (MR) — July 4 3
Test stands for fluid logic experimentation (MR) — Sept. 26 3
Ultrasonics aids in testing of adhesive bonds (MR) — Oct. 24 4
Update on welding – non-destructive tests for weld flaws — Feb. 28 80
'We cut back on machine testing...' Al Barr — Feb. 14 75

Threading (see Tapping)

Time and Motion Study
How to figure milling times. McFalls & Munson (charts & tables) (report) — Jan. 3-69-84
'So we switched to the decimal inch...' Frank Zagar — Nov. 7 140
Time recorders check on NC. Harry Wensching (table) — July 18 109

Tin – A bright acid plating system for tin (MR) — July 4 4

Titanium
Aircraft wheels (T) — June 6 33
Alloy improves spot and arc welds in titanium (MR) — Oct. 10 4
Already, a step beyond adaptive controls? – Aerospace manufacturers want to add process control to the working of exotic materials — Oct. 24 121
Close tolerances obtained with cast titanium (MR) — Jan. 31 3
Converted surface of titanium parts accepts lubricant (MR) — May 9 4
Expanding market for titanium (T) — Nov. 21 45
Fabricating techniques (T) — Nov. 7 41
How to bend titanium tubing. R.J. Bozung — Aug. 29 72
More titanium to go into 'copters (T) — Dec. 19 45
New fluids permit improved cutting of titanium (MR) — Aug. 29 3
Press can form titanium pan shape in one piece (MR) — May 9 3
Titanium alloy has creep resistance plus weldability (MR) — Aug. 1 3
Titanium oxide surface layer protects tools (MR) — June 20 4
Titanium parts diffusion bonded (T) — Dec. 5 35
Titanium sheet is cross rolled for uniform thickness (MR) — Nov. 21 3

Tool Show 1966
List of exhibitors — Apr. 11-155-160
Technical program — Apr. 11 161
Tool Show in Print — Apr. 11 162
1966 Tool Show Report — May 9 104

Toolholders
Center rest holds hexagonal bars. R.J. Phillip (PI) — Nov. 7 174
Combination work support and soft vise jaws. R.J. Hill (PI) — July 4 106
Drill holder for lathe. E. Foaht (PI) — Sept. 12 148
Expanding workholder. E. Jones (PI) — Sept. 26 135
Extension holder for taps. A. Wallace (PI) — Nov. 21 146
Fast ways to change work. B.C. Brosheer (report) 3. Standard and special devices for gripping workpieces for machining — Apr. 11-137-152
New type of toolholder with internal clamping (MR) — Mar. 14 4
Tool holder for heavy cuts. R. Phillips (PI) — Feb. 14 105
Tool holder for shaper. F. Rush (PI) — Jan. 31 86
Tool support for heavy cuts. M.W. Loftus (PI) — Sept. 26 136

Tools, Machinists Hand
Hand deburring tool. A.T. Pippi (PI) — Oct. 10 166
Portable tool removes burrs from tubing (MR) — Jan. 17 4

Trade (see Export; Import)

Training
Bell Helicopter's 'diagramatic planning': Helicopters in a hurry. Marvin Reid — Dec. 19 94
Even if the water is dirty, keep the baby (ed) — Feb. 28 69
Federal funds for employee training (T) — July 4 29
Machine tool builders will develop and promote on-the-job training (T) — Mar. 14 25
Manpower around the world, see **Labor**
NMTBA to add to training programs (T) — Mar. 14 41
NTDPMA wants new training pact (T) — Nov. 7 35
Not enough are running (ed) — Dec. 19 83
'Pony' speeds tape training. C.F. Brown — Apr. 25 94
Program for training 1800 unemployed as tool and diemakers (T) — Mar. 28 29
Retraining eases a phase-out at Watertown (Mass) Arsenal. H.J. Mote — Aug. 15 104
The training explosion report — June 6-95-142
The name of the bridge is training (ed) — June 6 95
From truck driver to tool and die apprentice — June 6 96
The boys from Bedford High — June 6 108
Job Entry Training – the JET program — June 6 114
How to get funds for training — June 6 119
Training from equipment suppliers — June 6 122
Training on a giant scale — June 6 124
Apprentice training across the country — June 6 129
Bringing the outsider in — June 6 134
Tailored training for incoming industry — June 6 138
Training for numerical control — June 6 141
Training procedure simplified (T) — July 4 41
Two reforms for training programs (ed) — June 20 115
Videotape aids tool rebuilding — Dec. 5 146
You can repair a roof in the rain (ed) — Jan. 3 53

Transfer Machines
Assemble-matic puts together differentials (MR) — Jan. 3 4
Dial M for mechanization at Eastman Kodak's Camera Works — Sept. 26 103
Machining the complex part — Sept. 12 107
1. Automating for low volume. B.C. Brosheer — Sept. 12 108
2. Automating for high volume. Charles Emerson — Sept. 12 111
Output is doubled with nine-station draw press (MR) — Jan. 3 4
Stored program control monitors transfer line (MR) — Jan. 17 3
300 cans a minute! Rupert Le Grand — June 20 126

Trimming (see Stamping)

Tubing
Custom-built, cut-to-length line. Frank Richardson — Jan. 31 69
How to bend titanium tubing. R.J. Bozung — Aug. 29 72
Working tube on a fourslide. E.V. Cavagnero (table) — Sept. 12 121

Tumbling (see Finishing)

Tungsten
GE does it: die-casts ferrous metals — May 23 111
More-machinable tungsten (T) — Jan. 3 33
Tungsten coatings applied by vapor-phase deposition (MR) — Apr. 11 4

Turning
Advanced tooling for tool room lathe. W. G. Ogden Jr. — May 23 141
An 'impossible' diamond tool to machine Gemini heat shield — June 20 120
Convex cutting on engine lathe. D. Kimberling (PI) — Jan. 31 86
Cutting radii on a lathe. A. Freiling (PI) — Apr. 25 116
Cutting thin disks in a lathe. J. Schmidt (PI) — June 6 152
East-West team up on NC lathe. J.R. Mixon — May 23 109
Lathe cuts internal grooves with offset boring head. R. Phillip (PI) — June 20 155
Machinability tests: a critique. G.B. Troup (charts & table) — Apr. 11 127
Modifications on NC turning machine improve precision (MR) — Nov. 7 4
A new look at stainless. S.E. Tyson (report) (charts & tables) — May 9-115-126
1966 outlook – Technical: cutting (report) — Jan. 17 114
Odd jobs for screw machines — Dec. 19 87
Sensitive templet controls tracer — Jan. 3 58
Seven operations handled on six-station turret lathe. R.J. Phillip (PI) — Sept. 26 135
Tracing operation replaces broaching and form tool cutting, doubles production of copper disks (cover) — June 20 1
Tracing takes on a new job. George DeGrsat — June 20 117
Turning eccentric parts. J. Schmidt (PI) — Nov. 7 173
Turning long, hollow cylindrical shapes. J. Schmidt (PI) — July 18 140
Turning tapered drill shanks. H. Divaris (PI) — Nov. 21 145
Turning to microinches — Nov. 7 145
Turret lathe shop tips. R.E. Callendar (PI) — Dec. 5 164
The versatile adaptive control. Reynolds & Norwood — May 23 103

(ed) Editorial. (MR) Metalworking Report. (PI) Practical Ideas. (T) Trends.

Work rest, adjustable. E. Goulet (PI) ... Feb. 28 110
Work supported during cut-off. R. Phillips (PI) ... Apr. 11 252
Workpiece counter for lathe. R. Hill (PI). Feb. 14 105

Twisting – New twist in helicopter blades. Art Zimmerman ... Jan. 3 60

U

Ultrasonics
Cleaning with ultrasonics. J.E. Sanford (charts & tables) (report) ... Feb. 14-87-98
TV monitor of metal flaws uses ultrasonic imaging (MR) ... Feb. 14 4
Two-step cleaning performed in one ultrasonic unit (MR) ... Jan. 3 4
Ultrasonic cutter can even be used to machine glass (MR) ... July 18 3
Ultrasonics aids in testing of adhesive bonds (MR) ... Oct. 24 4
Ultrasonics gives assist in tapping nuts (MR) ... Apr. 11 4

V

V-blocks
EDM cuts hole in V-block to handle headed pins. C. Frank (PI) ... Feb. 14 105
Holding headed pins in a V-Block. R. Hill (PI) ... May 9 138
V-block adjusts to stepped shaft sizes. M.W. Day (PI) ... Aug. 15 129

Valves – Valves are self-indicating. A. Vena (PI) ... Dec. 19 124

Vibration
Big shaker can test those large assemblies ... Apr. 11 301
Damping device kills vibration during milling (MR) ... July 18 4

VIPortraits
Bornhauser, Leroy B. ... May 23 145
Buehler, John L. ... June 20 159
Day, Ralph W. ... Mar. 14 163
Dewhurst, John D. ... Feb. 14 109
DeWolf, A.J. ... Nov. 7 136
Fussell, I.K. ... Aug. 15 120
Gilbert, Dr. William W. ... Jan. 17 143
Loewen, Erwin G., Dr. ... Oct. 10 130
Ransburg, Harold P. ... Apr. 25 119
Weitzel, Lawrence M. ... July 18 122

Vises
Combination work support and soft vise jaws. R.J. Hill (PI) ... July 4 106
Cover protects vise handle. F. Fehely (PI) ... June 6 152
Fast ways to change work. B.C. Brosheer (report) 3. Standard and special devices for gripping workpieces for machining ... Apr. 11-137-152
Inexpensive sine vise. P. Kagan (PI) ... Sept. 12 147
Jaws extend vise capacity. A. Pippi (PI) ... Jan. 3 94
Safety handle for vise. F. Fehely (PI) ... May 23 142
Swivel grip for toolmaker's vise. E.J. Goulet (PI) ... Oct. 10 165
Tapered vise jaw holds rounds for milling. R.J. Phillip (PI) ... Dec. 5 164
Vise holds thin work. K. Gupta (PI) ... May 23 142

W

Washers – Washer workpieces split on special mandrel. F. Rush (PI) ... Apr. 25 115

Washing Machines (see Cleaning)

Weight – Initial ten sets of primary weight standards (T) ... Aug. 29 39

Welding
Adaptive control checks weld heat with infrared (MR) ... Apr. 11 3
Adaptive controls operate a numerically controlled spotwelder (T) ... Feb. 14 19
'Adaptive spotwelding' – Adaptive control and numerical control teamed up at Boeing. A.M. Sciaky ... Dec. 19 85
Alloy improves spot and arc welds in titanium (MR) ... Oct. 10 4
Arclad weld-clads stainless on top of low-alloy steel (MR) ... Sept. 12 3
Automatic feed gives stud welder 30-pc/min rate (MR) ... May 9 4
The case for the tailored arc – American Welding Society meeting ... May 9 101
Coil-strip welder is 44-in. long, auto-controlled (MR) ... Jan. 31 3
Computer reads feedback data from Tig arc (MR) ... Sept. 26 4
Electrical wire used as copper welding material. A. Vena (PI) ... July 4 106
EB welder is portable and out of vacuum (MR) ... Apr. 25 4
Electron beam welds 5-in.-thick stainless ... Feb. 14 179
Fabricating zinc-coated steel. Roger Gardner (tables) ... Feb. 14 83
First Tig, then Mig – now it's Pig welding (MR) ... July 18 4
Galvanized coat affects spotwelds and sheet steel (MR) ... Sept. 26 4
Gas tungsten-arc welding being done on continuous-path NC machine. Stoeckinger & Littlefield ... Aug. 1 95
Gemini capsule section is held in a spotwelding fixture that floats on a film of air (cover) ... May 9 1
Gemini spacecraft – fingertips move weld fixtures at McDonnell Aircraft. Dubusker & Robertson ... May 9 97
HCD welding gun uses low-voltage electron beams (MR) ... Sept. 26 3
HF welding mill makes brass tubing at 500 fpm ... July 4 133
HF welding of coated metals conserves coatings (MR) ... Jan. 31 4
How to weld dissimilar steels (table) ... Jan. 31 74
How to work the super 12% Cr steels. Briggs & Parker (report) (charts & tables) ... Mar. 14-139-150
Indexing machine assists vacuum EB welder (MR) ... May 9 4
Magnetic control for arc welding is focus of research (MR) ... May 9 3
Microcircuit bonding system has dual heads (MR) ... Jan. 17 3
Navy's Mark 16 torpedo – How to 'butter up' a weld ... Aug. 1 90
Needle arc plasma weld for low amps (MR) ... Apr. 25 3
New iron alloy gives assist in welding of steel (MR) ... Oct. 10 3
New methods for welding two-ton aluminum rings (MR) ... Jan. 31 4
Nickel-braze method for repair of jet engines (MR) ... July 4 4
1966 outlook – Technical: welding (report) ... Jan. 17 111
NC arc welder tackles the tough jobs (MR) ... July 18 3
Plasma cutter can contour at speeds to 250 ipm (MR) ... Apr. 25 3
Plasma gun welds stock 3/8 in. thick (MR) ... June 6 4
Portable blast welder (T) ... Dec. 5 41
Precision control holds weld bead within 0.001 in. (MR) ... July 18 4
Pulsed arc gives assist to MIG welding (MR) ... May 9 3
Quality welds at low cost. T.C. Junk ... June 20 134
Resistance welding of steel tubes. Max Osborn (*Ref.* Bk. Sheet) 1. Oct. 10-155, 157, 2. ... Oct. 24-155-157
Salvaging a welding rod. A. Vena (PI) ... Feb. 14 106
Shielding gas gets nitrogen for better weld (MR) ... Aug. 29 3
Short-arc shortcuts pipe welding ... Jan. 3 65
Simple gage reads compression of welded seals (MR) ... Jan. 3 3
Spray transfer arc welding at lower power (MR) ... Oct. 10 4
Suggest MAPP gas over acetylene for metallizing (MR) ... Sept. 26 4
System both strips and welds insulated wire (MR) ... Aug. 29 4
Triple play on an NC machine. B.C. Brosheer ... Sept. 26 126
Twisted-together welding wires make custom alloys (MR) ... May 23 4
Two approaches to deeper, faster Tig welding (MR) ... Oct. 10 4
Update on welding – NC positioning for airframe spotwelding; non-destructive tests for weld flaws ... Feb. 28 80
Weld steel tubing for high-strength machine column (MR) ... June 6 4
Welder combines adaptive control, tape positioning (MR) ... Oct. 24 3
Welding a tilted contour for the Shillelagh bulkhead assembly. George Merrick & others (tables) ... Aug. 1 100
Welding zinc-coated sheet ... Mar. 28 70

Wheels (see Grinding)

Winding – Fast winder is card controlled to make coils (MR) ... Apr. 25 3

Wire
Electrical wire used as copper welding material. A. Vena (PI) ... July 4 106
High-strength steel wire parts can replace castings, weldments, and cut products costs (cover) ... Apr. 25 1
How to skeletonize products – working with steel wire ... Apr. 25 90
Pressure vessels formed with wire and electroforming (MR) ... Aug. 29 4
System both strips and welds insulated wire (MR) ... Aug. 29 4
Twisted-together welding wires make custom alloys (MR) ... May 23 4

Wrenches
Box wrench altered for open end use. E. Goulet (PI) ... Mar. 14 160
Electromagnetic wrench produces accurate torque (MR) ... Mar. 14 4
Sockets for power wrenches. J.R. Haynes (Ref. Bk. Sheet) ... July 4 101

Wrought iron – a space-age metal (T) ... Jan. 31 41

X

X-Rays – X-Rays give assist in measuring plating thickness (MR) ... June 20 3

Z

Zinc
Fabricating zinc-coated steel. Roger Gardner (tables) ... Feb. 14 83
1966 outlook – Technical: materials (report) ... Jan. 17 119
Neutral zinc-plating solution is applied direct (MR) ... Aug. 15 4
Welding zinc-coated sheet ... Mar. 28 70

Zirconium – R&D in hafnium and zirconium (T) ... May 9 41

COMPANY INDEX

(includes only feature articles)

A

Aerojet Corp. Machining SS to tight tolerances — Feb. 28 75
All Canada Engineering Co. Ltd. Blanking line cuts setup time — Mar. 14 124
Alpha Products, Inc. Locking-type indexing fingers. Federico Strasser (Ref. Bk. Sheets) 1. Nov. 21-139, 2. Dec. 5-157, 3. — Dec. 19 119
Alum-A-Form Co. Flying die spreads roll forming. George DeGroat — Feb. 28 78
American Bosch Arma Corp. One chucker outworks two lathes — Feb. 28 85
Andale Co. Getting started with NC: Paperwork. C.F. Brown — Nov. 7 161
'Pony' speeds tape training. C.F. Brown — Apr. 25 94
Armco Steel Corp. Fabricating with zinc-coated steel. Roger Gardner (tables) — Feb. 14 83
Arrow Tool Co. Dewhurst, John D. — VIPortrait — Feb. 14 109
Auto Union. New life for an old automaker. Charles Emerson — Aug. 29 74
Automatic Electric Co. Switches from lard oil to reclaimable petroleum-base cutting oil — Apr. 11 126
Avco Corp. NC retrofit speeds Apollo production — Apr. 11 131

B

Babcock & Wilcox Co. Rolled rings, 1 & 2. J.F. Beck (Ref. Bk. Sheets) (table) — Mar. 14 151
Balfield Industries Inc. Snakeye production — keeping the Snakeyes rolling. Ranill & DeGroat — Aug. 1 108
Bausch &Lomb. Loewen, E.G., Dr. — VIPortrait — Oct. 10 130
Bell Helicopter Co. 'Copters — rush! Marvin Reid — Feb. 14 80
Bendix Field Engineering Corp. Job shop for NASA space vehicles — Feb. 14 82
Bliss & Laughlin Industries. Machinability tests: a critique. G.B. Troup (charts & table) — Apr. 11 127
Boeing Co.'Adaptive spotwelding' — Adaptive control and numerical control teamed up at Boeing. A.M. Sciaky — Dec. 19 85
Hot presses bond skin to helicopter blades — Apr. 25 100
Milling boosts lunar payload. Nansen & Albert — Feb. 28 71
NC positioning for air frame spotwelding — Feb. 28 80
Bolton-Emerson. Sharp ideas raise knife output. Harry Mole — July 18 124
Bozung, J.A. Co. How to bend titanium tubing. R.J. Bozung — Aug. 29 72
Bridgeport Brass Co. How to clean copper parts (Ref. Bk. Sheet) — May 23 137
Bucyrus-Erie Co. How to machine a giant. H.A. Squires — Mar. 14 132
Buehler Corp. Buehler, John L. — VIPortrait — June 20 159
Buhr Machine Tool Co. Transfer lines get 'tight' — machining complex parts for anti-smog device — Jan. 3 66

C

Carbidex Corporation. Diemaker turns parts maker — Dec. 5 125
Carpenter Steel Co. A new look at stainless. S.E. Tyson (report) (charts & tables) — May 9-115-126
Caterpillar Tractor Co. Water cuts the cost of coating — Sept. 26 111
Chesapeake & Ohio Railway. NC puts punch in a punch — Oct. 10 126
Chrysler Corp. Bomhauser, Leroy B. — VIPortrait — May 23 145
Computer takes on new jobs. Charles Emerson — Jan. 3 55
The push for NC die milling — Jan. 17 89
Churchill, Charles Group. Tube investments Ltd. offers to buy company — Feb. 28 74
Cincinnati Milling Machine Co. 'Bugs' shrink contouring NC — Aug. 29 77
Cleveland Crane & Engineering Co. Tonnage chart for various bend angles. R.F. Dehn (Ref. Bk. Sheet) (chart) — Apr. 11 247
Tonnage for air bends, 1 & 2. R.F. Dehn (Ref. Bk. Sheets) (chart) — Mar. 28 97
Tonnage vs stroke of press brakes. R.F. Dehn (Ref. Bk. Sheet) (chart) — Apr. 11 245
Combustion Engineering, Inc. Urethane die gets 'workhorse' role. C.H. Becker — Jan. 31 72
Cowan & White, Inc. Getting started with NC: Planning. R.H. Cowan — Nov. 7 148
Cross Co. Specials 'built' by computer. James Sandford (tables) — Sept. 12 115
Cummins Engine Co. New way to harden gears. Craig & Delinger — Apr. 25 103

D

De Beers, Industrial Diamond Div. Diamond grinding today. J.J. Dwyer Jr. — Oct. 24 122
Deere & Co. Multiple setups speed output. B.C. Brosheer — May 9 111
Tandem NC pays off fast. Ethington & Euchner — Feb. 28 81
Deublin Co. Threader eliminates 'wobble' in rotors. L.H. Deubler — Aug. 1 107
Diamond Alkali Co. How black is black chrome? — Dec. 19 88
Dickie-Glaser Co. A computer picks a machine. J.H. Schaefer (table) — Aug. 1 93
Douglas Aircraft Co, Inc. NC welder goes into action. Stoeckinger & Littlefield — Aug. 1 95
Dumore Co. Tricks with tool attachments. Bernard Michels — Jan. 17 82
Duramir BK. How black is black chrome? — Dec. 19 88
Dyna Systems, Inc. The versatile adaptive control. Reynolds & Norwood — May 23 103

E

East Dayton Tool & Die Co. Trouble shooting porcelain-enameled stampings, 1 & 2. G.H. Fisher (Ref. Bk. Sheets) — Jan. 31 77
Eastman Kodak Co. Dial M for mechanization — Sept. 26 103
Odd jobs for screw machines — Dec. 19 87
Electric Tachometer Corp. Time recorders check on NC. Harry Mensching (table) — July 18 109
Electro-Design Ltd. Blanking line cuts setup time — Mar. 14 124

F

Fafnir Bearing Co. Marquench cuts distortion, costs — Jan. 17 86
Falstrom Co., Welding Production Div. Resistance welding of steel tubes. Max Osborn (Ref. Bk. Sheet) 1. Oct. 10-155, 157, 2. — Oct. 24-155-157
Firth Sterling, Inc. Carbide-tool breakage. V.G. Yost (Ref. Bk. Sheets) — Apr. 25 187
Ford Motor Co. Controls on presses have new safety features — Mar. 28 149
Expands forge plant — Feb. 14 86
NC at Ford. Emerson & Hatschek — Jan. 17 90
Patterson, Charles, receives first AM Award — Jan. 3 59
The push for NC die milling — Jan. 17 89
Fusion, Inc. Going to mechanized soldering and brazing? George Williams (table) — Aug. 1 89

G

Galt Metal Industries Ltd. Blanking line cuts setup time — Mar. 14 124
General Dynamics. HERF bangs out long extrusions — July 18 115
HERFing in a Shaw-cast die — July 4 68
General Electric Co. Die-casting ferrous metals — May 23 111
Gilbert, Dr. William W. — VIPortrait — Jan. 17 143
How to figure milling times. McFalls & Munson (charts & tables) (report) — Jan. 3-69-84
Non-destructive tests for weld flaws — Feb. 28 80
NC puts punch in a punch — Oct. 10 126
Plating with diamonds. Kenneth Gillis — May 9 102
Regenerative shop planning. R.B. Scott (report) (tables) — Mar. 28-89-94
Resin system speeds motor insulation — July 18 105
Retooling for nuclear power. Harry Mole — Sept. 26 116
Why a measuring machine? L.R. Ormston — Sept. 26 122
General Motors Corp. Cast dies for auto forgings. Charles Emerson — Oct. 10 132
EDM tailored for precision. McMillan & LaBoda — Dec. 5 144
Line jumps piston output 50%. J.E. Sandford — Jan. 17 84
Machining the complex part — 2. Automating for high volume — Sept. 12 111
The push for NC die milling — Jan. 17 89
Giannini Scientific Corp. — Spraying metal by electric arc. Joe Rosenbery — Jan. 31 66
Gilman Engineering. Assembly banks pay high dividends (charts) — Sept. 26 121
Gumard Manufacturing Co, Inc. Recessing tool cuts job time 75% — Aug. 15 118

H

Hallmark Cards, Incorporated. Fine-grooving for 3-D prints. B.C. Brosheer — Oct. 24 119
Harron, Rickard & McCone. Videotape aids tool rebuilding — Dec. 5 146
Heald Machine Co. Multiple-wheel internal grinding. Fred Thomas (Ref. Bk. Sheet) — Sept. 26 127
Helmuth Tool & Die. Low-cost NC contouring. James Sandford (chart) — Apr. 25 83
Honeywell Inc. Breakeven, for bulk solvents — Dec. 5 148
Hurletron Inc. 'For hire' mobile QC labs — Jan. 17 79
Hurth, Carl Co. How to reduce hardening distortion in steel gears — Tufftriding process — Nov. 21 114

I

International Appliances. Plated nickel shapes up. James Sandford — Oct. 10 125
International Business Machines Corp. How IBM presets NC tooling. G.R. Nelson — Apr. 25 97
ITT Corp. Three roads to reliability. 2. Make 'Zero Defects' a way of life. Philip Crosby — Jan. 31 64

J

Japax Scientific Corp. Now it's ECDM! George De Groat — Apr. 11 123
Jergens Tool Specialty Co. Hydraulic clamping simplified. Harry Mole — Dec. 5 135
Jerobak-Bayless Co. Gun drilling goes to great lengths — Nov. 21 111

K

Kaman Aircraft. A new twist in helicopter blades. Art Zimmerman ... Jan. 3 60
Kearney & Trecker Corp. Air-conditions its whole plant ... July 18 110
Chain stretches tool limit. Erich Dreschler ... Feb. 14 73

L

Lafayette Grinding Corp. Fine grinding of huge plates. J.E. Sandford ... Mar. 28 86
LeaRonal, Inc. Plated nickel shapes up. James Sandford ... Oct. 10 125
The Lees-Bradner Company. Short run hobbing on a rotary. George Viscomi ... July 4 66
Lincoln Machine Parts Corp. Skiving on automatics. G.T. Walsh ... Feb. 28 88
Lindell Forge Co. Drop-forged parts to close tolerances with same old process but new methods ... Feb. 28 149
Lockheed-Georgia Co. NC is management's baby. James Sandford ... Sept. 26 106
Shop laser checks NC positioning accuracy. James Sandford ... Nov. 21 118
Tighter tolerances for chemical milling ... Dec. 19 89
Lockheed Missiles & Space Co. Building batteries for space. W.J. Corner ... Mar. 14 121
Joining beryllium to stainless. W. Kudenov Jr. ... Sept. 12 118

M

Mack Trucks, Inc. Press-brake bends. W.J. Wess (Ref. Bk. Sheet) ... Nov. 7 167
Main Steel Polishing. Fast polish for stainless sheet. James Sandford ... July 18 130
Martin-Orlando. Danger – laser. Rex Rhein ... June 20 119
McDonnell Aircraft Corp. Fingertips move weld fixtures. Dubusker & Robertson ... May 9 97
An 'impossible' diamond tool to machine Gemini heat shield ... June 20 120
Mechanical Specialties Co. Weitzel, Lawrence M. – VIPortrait ... July 18 122
Merrick Engineering Inc. Welding a tilted contour. George Merrick & others ... Aug. 1 100
Metcut Research Associates, Inc. Needed: reliable machinability data. Norman Zlatin (chart) ... Sept. 26 109
Metem Corp. Dual tooling for EDM-ECM. Charles Emerson ... Aug. 15 112
Metropolis Spinning and Stamping Co. Bulging with a spring punch. M.J. Goldstein ... Mar. 28 77
Milton Roy Co. Getting started with NC: Selection. H. Van Parys ... Nov. 7 155
Minnie Punch & Die Co, Inc. Steel die kit for short runs – Bennett die. Rupert Le Grand ... Aug. 1 104
Minster Machine Co. 300 cans a minute! Rupert Le Grand ... June 20 126
Moehlenpah Engineering of Kansas City. A computer picks a machine. J.M. Schaefer ... Aug. 1 93
Moog Inc. NC cuts short-run 'stampings'. C.C. Treff ... Aug. 15 101
Moore Special Tool Co. Repeatability to 0.2 millionth! W.R. Moore ... Aug. 29 65

N

New Britain Machine Co. 'We cut back on machine testing...' Al Barr ... Feb. 14 75
New York's American Spinning & Stamping Co. Drawing thick aluminum shell. M.J. Goldstein ... Dec. 5 136
Northrop Corp., Molding a 10-foot plastic ball. A.M. Guerreiro ... Mar. 14 128
Norton Co. Abrasive machining in focus. J.E. Haggett (chart) ... Aug. 29 70
Nova-Chrome, Inc. Dual power is key to plating technique. Hans Hausner ... Apr. 25 102
Numatics Inc. Air controls machine tools – Numatrol. Charles Emerson ... Dec. 5 139
Numerical Cutting Inc. NC takes on 'non-NC' jobs. E.C. Brown Jr. ... Aug. 15 116

O

Oldberg Manufacturing Co. Custom-built, cut-to-length line. Frank Richardson ... Jan. 31 69
Olin, Winchester-Western Div. A guide to heat treating. R.L. Suffredini (charts) ... July 18 111
Olivetti's. Auto dies by computer. Jack Star ... Nov. 21 112
Overly Manufacturing Co. Scheduling with a computer. Rupert Le Grand ... Oct. 10 121

P

Pacific Pipe Co. Short-arc shortcuts pipe welding ... Jan. 3 65
Pantool Machine Tools & Instruments. Tolerances for balancing, 1 & 2. H.E. Mueller (Ref. Bk. Sheets) (chart) ... Feb. 14 99
Picatinny Arsenal. Drilling by ear. Joseph Kuletz ... July 4 63
Planning Research Corp. 'Job shop' for NC tapes. George DeGroat ... Jan. 31 70
Platronics, Inc. Gold plating costs come down. J.E. Sandford (table) ... Jan. 3 62
Plaza Tool & Die Corp. Tooling a fourslide, 9. C.J. Labonack ... May 9 108
Plymouth Stamping Co. Braze plus solder makes cans ... Jan. 17 87
Pneumo Dynamics. How to 'butter up' a weld ... Aug. 1 98
Pratt & Whitney Aircraft. Faster way to contour mill. Rupert Le Grand ... Mar. 28 72
The training explosion report – Training on a giant scale ... June 6 124
Triple play on an NC machine. B.C. Brosheer ... Sept. 26 126
Printing in Dimension Corp. of California. Fine-grooving for 3-D prints. B.C. Brosheer ... Oct. 24 119

R

Ransburg Electro-Coating Corp. Ransburg, Harold P. – VIPortrait ... Apr. 25 119
Reliance Steel & Aluminum Co. Flame cutting to tight specs. George DeGroat ... Dec. 5 133
Risdon Manufacturing Co. Bulging dies go glamorous ... Jan. 17 77
Rock Island Arsenal. Tapping an 'impossible' steel. R.A. Kirschbaum ... Nov. 21 107
Time recorders check on NC. Harry Mensching (table) ... July 18 109
Rockwell Manufacturing Company. Day, Ralph W. – VIPortrait ... Mar. 14 163
Drillpress does tapping, too ... Aug. 15 122
The training explosion report – Tailored training for incoming industry ... June 6 138
Work centers tackle big jobs. W.E. Ramsden ... July 18 106
Rohr Corp. NC for stretch dies. Max Lofton ... Aug. 15 106
Rollway Bearing Co, Inc. 'Instant history' slashes repair costs. William Daly ... Dec. 19 96

S

Sandvik Steel Inc. Prehardened strip cuts costs (charts) ... July 18 118
Schlumberger, Fussell, I.K. – VIPortrait ... Aug. 15 120
Sciaky Bros. 'Adaptive spotwelding' – Adaptive control and numerical control teamed up at Boeing. A.M. Sciaky ... Dec. 19 85
Sel-Rex Corp. Gold plating costs come down. J.E. Sandford (table) ... Jan. 3 62
Shore, Phil Manufacturing Co. Compound die for heavy work. M.J. Goldstein ... May 23 114
Signode, Inc. Quench furnace runs the gamut ... Mar. 28 75
Siskin Steel and Supply Co. Infra-red heaters control condensation and improve working conditions in metal products warehouse ... Sept. 26 105
Snyder Corp. Sensitive templet controls tracer ... Jan. 3 58
Southern States Containers. Nesting drums hatch savings. Fran Ridgway ... Aug. 15 115
Spare Inc. Contouring on point-to-point NC. George DeGroat ... Aug. 15 110
Speedring Corp. Tools rebuilt to space specs ... Dec. 19 92
Spielberg, L. & Sons, Inc. Air-electric controls for dies. M.J. Goldstein ... Feb. 28 86
Standard Screw Co. Oil cools drills at 750 psi. H.C. Lindberg ... Apr. 25 101
Standard-Thomson Co. Rx for chip contamination ... Mar. 14 131
Sundstrand Machine Tool. Machining the complex part 1. Automating for low volume. Ben C. Brosheer ... Sept. 12 107
Sunnen Products Co. Getting parts to machines fast. J.K. Berthold ... Sept. 12 108
Manual stroke honing at work. B.R. McConnell Sr. (tables) ... Aug. 29 68
Superior Coach Corp. Welding zinc-coated sheet ... Mar. 28 79

T

Taylor-Winfield Corp. Wing bending methods. E.P. Schneider (Ref. Bk. Sheets) ... Mar. 28 70
Thomas Tool & Die Co. Double cam slide boosts punch travel ... June 6 143
Thompson Grinder Co. Fine grinding of huge plates. J.E. Sandford ... Dec. 5 138
Torrington Manufacturing Co. Working tube on a fourslide. E.V. Cavagnero (table) ... Mar. 28 86
Toyota Motor Co. NC grinder cuts auto cams. Yasumasa Ishihara ... Sept. 12 121
Tube Investments Ltd. Offers to buy Charles Churchill Group ... Sept. 26 112

U

Union Carbide Corp. Turning to microinches ... Feb. 28 74

V

Van Keuren Co. How to measure flatness. J.K. Emery (report) (table) ... Nov. 7 145
Varian Associates. Making NC buy itself. George DeGroat ... Aug. 29-79-86
Tracing takes on a new job. George DeGroat ... Nov. 7 133
Vickers Inc. Tips on hydraulics from Vickers ... June 20 117
Vico Products Co. Carbide surfacing improves tool life ... July 4 73
Visual Impact, Inc. Fine-grooving for 3-D prints. B.C. Brosheer ... Mar. 28 83
Volkswagen. Tooling the new Volkswagens. Charles Emerson ... Oct. 24 119
VW figures prove out cold forming ... July 4 74
July 18 121

W

Watertown Arsenal. Retraining eases a phase-out. H.J. Mote ... Aug. 15 104
Westinghouse Electric Corp. AM Award: Donald C. Burnham (cover) Dec. 19-1,.. Dec. 19 98
Quality welds at low cost. T.C. Junk ... June 20 134
Westinghouse Machine Tool Electrification Forum. R.L. Hatschek ... June 20 122
Wheelabrator Corp. Pulsing coolant speeds drilling. E.A. Rich (charts & tables) ... Apr. 25 86
Williams, J.H. & Co. Sockets for power wrenches. J.R. Haynes (Ref. Bk. Sheet) ... July 4 101
Woodward Governor Co. Triple play on an NC machine. B.C. Brosheer ... Sept. 26 126

X

Xerox Corp. ECM teams up with NC ... June 20 128

Z

Zagar, Inc. 'So we switched to the decimal inch...' Frank Zagar ... Nov. 7 140

AUTHOR'S INDEX

A

Adams, F. Adjustable spur gear eliminates backlash — Mar. 14 160
How to cut work square — Jan. 3 94
Hydraulic cylinder leak test — Feb. 28 110
Albert, G.T. & R.H. Hansen. Milling boosts lunar payload — Feb. 28 71
Ashburn, Anderson. An industry built on change — May 9 95
An unexpected fringe benefit — Nov. 7 131
The barrier of Babel — Aug. 29 63
A brief stop on cloud eight — Aug. 1 87
The case of the missing ballots — May 23 101
The clearing outlook — Nov. 21 105
Even if the water is dirty, keep the baby — Feb. 28 69
How to cure a cry-baby — Mar. 14 119
The lesser evil — Sept. 12 105
The name of the bridge is training — June 6 95
The new army game — Mar. 28 63
Not enough are running — Dec. 19 83
A note of thanks — Mar. 28 63
Open letter — Aug. 15 99
The other side of the coin — Oct. 24 117
A pendulum is to swing — July 4 61
The price of harmony — July 18 99
The Quaker and the Quill — Jan. 17 75
The shortest memory in the world — Jan. 31 61
The test that binds — Feb. 14 71
Three rings for Osaka — Nov. 7 135
A time to extend competition — Apr. 11 121
To dream the impossible dream — Oct. 10 119
Two reforms for training programs — June 20 115
The unexpected scramble — Dec. 5 123
Who's afraid of numerical control? — Apr. 25 81
You can repair a roof in the rain — Jan. 3 53

B

Baer, F.H. Gmo: window on the East — Dec. 5 150
Baker, O.M. Reversible drill jig — June 20 156
Barr, Al. 'We cut back on machine testing . . .' — Feb. 14 75
Beck, John F. Rolled rings, 1 & 2 — Mar. 14 151
Becker, C.H. Urethane die gets 'work-horse' role — Jan. 31 72
Berthold, J.K. Getting parts to machines fast — Aug. 29 68
Blasioli, D. Tool spins burrs off plate — Mar. 14 160
Bossman, C. Screw slotting tool — Feb. 28 109
Bozung, R.J. How to bend titanium tubing — Aug. 29 72
Bradley, N. Drilling holes in rubber — Mar. 14 159
Pin adds grips to studs — Feb. 14 106
Plexiglas protects optics — May 9 138
Briggs, J.Z. & T.D. Parker. How to work the super 12% Cr steels — Mar. 14-139-150
Brootzkoos, S.D. Cold extrusion — Oct. 10-135-150
Brosheer, Ben C. The Army rediscovers NC — Mar. 28 65
Fast ways to change work, 3 — Apr. 11-137-152
Fine-grooving for 3-D prints — Oct. 24 119
Machining the complex part
1. Automating for low volume — Sept. 12 108
Multiple setups speed output — May 9 111
Triple play on an NC machine — Sept. 26 126
Brosheer, Ben & R.L. Hatschek. A look at 'fluidic' machine controls — Apr. 11 134
Brown, C.F. Getting started with NC: Paperwork — Nov. 7 161
Groove stops coolant spillage — Mar. 14 159
NC drilling beyond normal table range — Jan. 17 139
'Pony' speeds tape training — Apr. 25 94
Brown, E.C. Jr. NC takes on 'non-NC' jobs — Aug. 15 116
Bullough, W. Drills that won't slip — Apr. 25 115
Butler, J.R. Rubber ring expands to hold collets — Oct. 24 161

C

Cady, P. Indicator becomes depth gage — Jan. 3 93
Callendar, R.E. Turret lathe shop tips — Dec. 5 164
Cavagnero, E.V. Working tube on a four-slide — Sept. 12 121
Chepko, F.E. Cold-finished carbon steel bars — Aug. 1 111
Forging today — Nov.21-121-136
Clark, S. Carbon steel drill upgraded — Oct. 10 165
Connor, Warren J. Building batteries for space — Mar. 14 121
Cook, G. & others. Welding a tilted contour — Aug. 1 100
Cowan, R.H. Getting started with NC: Planning — Nov. 7 148
Craig, J.F. & G.R. Delinger New way to harden gears — Apr. 25 103
Crosby, Philip. Three roads to reliability.
2. Make 'Zero Defects' a way of life — Jan. 31 64
Cross, Bruce. Manpower around the world: Mexico — July 18 126

D

Daly, William. 'Instant history' slashes repair costs — Dec. 19 96
Day, M.W. Clamping strip anchored in lathe toolpost — June 6 151
V-block adjusts to stepped shaft sizes — Aug. 15 149
DeGroat, George. And now it's ECDM! — Apr. 11 123
Contouring on point-to-point NC — Aug. 15 110
Flame cutting to tight specs — Dec. 5 133
Flying die speeds roll forming — Feb. 28 78
'Job shop' for NC tapes — Jan. 31 70
Making NC buy itself — Nov. 7 133
Tracing takes on a new job — June 20 117
What's new in powder metallurgy — Oct. 24-135-154
DeGroat, G. & J. Ranill. Snakeye production — keeping the Snakeyes rolling — Aug. 1 108
Dehn, Roy F. Tonnage chart for various bend angles — Apr. 11 247
Tonnage for air bends, 1, 2 — Mar. 28 97
Tonnage vs stroke of press brakes — Apr. 11 245
Delinger, G.R. & J.F. Craig. New way to harden gears — Apr. 25 103
Deubler, L.H. Threader eliminates 'wobble' in rotors — Aug. 1 107
Divaris, H. Cutting long shafts without supports — Apr. 25 116
Set screw increases safety of C-clamp — Nov. 7 173
Turning tapered drill shanks — Nov. 21 145
Dreschler, Erich. Chain stretches tool limit — Feb. 14 73
Dressler, R.A. Expanding sleeve stud arbor — Aug. 29 92
Fixture permits fine grinding — Apr. 11 251
Dubusker, William & P.R. RoLertson, Fingertips move weld fixtures — May 9 97
Dwyer, J.J. Jr. Diamond grinding today — Oct. 24 122

E

Emerson, Charles. Air controls machine tools — Dec. 5 139
Automatic assembly: its potentials and pitfalls — Feb. 28-93-100
Cast dies for auto forgings — Oct. 10 132
Computer takes on new jobs — Jan. 3 55
Dual tooling for EDM-ECM — Aug. 15 112
Estimating with a computer — Nov. 21 115
Machining the complex part
2. Automating for high volume — Sept. 12 111
New life for an old automaker — Aug. 29 74
Tooling the new Volkswagens — July 4 74
Tooling up the Toronado — June 20 123
Emerson, C.D. & R.L. Hatschek. NC at Ford — Jan. 17 90
Emery, J.K. How to measure flatness — Aug. 29-79-86
Enrick, Dr. Norbert L. Three roads to reliability. 1. QC: its new implications — Jan. 31 63
Ethington, E.D. & J.H. Euchner. Tandem NC pays off fast — Feb. 28 81
Euchner, J.H. & E.D. Ethington, Tandem NC pays off fast — Feb. 28 81
Eyman, A.T. Keep production flowing — Oct. 24 127

F

Febely, F. Cover protects vise handle — June 6 152
Drill substitutes for transfer punch — Mar. 28 108
Making transfer screws — July 18 140
Safety handle for vise — May 23 142
Tool removes filing burrs — May 9 137
Fisher, C.H. Trouble shooting porcelain-enameled stamping, 1, 2 — Jan. 31 77
Foalt, E. Drill holder for lathe — Sept. 12 148
Frank, C. EDM cuts hole in V-block to handle headed pins — Feb. 14 105

G

Gardner, Roger. Fabricating zinc-coated sheet — Feb. 14 83
Garrett, D.M. Worm gear cut quickly — Nov. 7 173
Gelb, R.R. Quick way to gage depth when milling keyways — July 4 136
Sine bar built into fixture — Oct. 24 162
Gillis, Kenneth. Plating with diamonds — May 9 102
Glossop, Sydney. Army's do-it-yourself specials — June 20 136
Goldstein, M.J. Air-electric controls for dies — Feb. 28 86
Bulging with a spring punch — Mar. 28 77
Compound die for heavy work — May 23 114
Drawing thick aluminum shell — Dec. 5 136
Tool for odd-shaped shell — Jan. 31 85
Goulet, E. Adjustable work rest — Feb. 28 110
Box wrench altered for open end use — Mar. 14 160
Drafting method simplifies steel-rule-die building — Aug. 15 129
Expanded micrometer face gages rubber surfaces — Nov. 21 145
Extra length improves bushing — Dec. 5 163
Gage reads radius, fillet — Sept. 26 126
Horizontal miller spots work — Dec. 19 124
Rubber boot preserves thread gage accuracy — Aug. 1 118
Screw drift eases cutters out of fixed position — Jan. 31 86
Simple vee measures three-flute drills — June 20 156
Sleeve assists centerdrill — July 18 139
Standard pins and gages blocks amplify countersink check — Nov. 7 174
Swivel grip for toolmaker's vise — Oct. 10 165
Torque screw driver speeds assembly — Mar. 28 107
Work rest is located by part being cut — Apr. 25 115
Greiling, A. Cutting radii on a lathe — Apr. 25 116
Grenon, R. Low cost bending die handles short runs — May 9 137
Griffin, G. & others. Welding a tilted contour — Aug. 1 100
Grossman, J. How to drill fine holes — Dec. 19 123
Guerreiro, A.M. Molding a 10-foot plastic ball — Mar. 14 128
Gupta, K. Vise holds thin work — May 23 142

H

Haggett, J.E. Abrasive machining in focus — Aug. 29 70
Hatschek, Robert L. All-NC show bows at Olympia — May 23 106
The 'far out' processes get a going over — Nov. 21 108
NC takes a look at itself — Apr. 25 96
What? Asymmetric HERFing? — June 20 122
Whither NC? Asks DOD — Oct. 24 125
Hatschek, R.L. & Ben Brosheer. A look at 'fluidic' machine controls — Apr. 11 134
Hatschek, R.L. & C.D. Emerson. NC at Ford — Jan. 17 90
Hausner, Hans. Dual power is key to plating technique — Apr. 25 102
Haynes, J.R. Sockets for power wrenches — July 4 101
Heiman, U. Wheel wobble does some good — Apr. 11 252
Hennig, P.T. Angled grinding wheel prevents burning — Sept. 12 147
Combination tool stops and ejects workpiece — May 23 142
Multiple parts fixture — Oct. 10 165
Revolving broach and burnishing tool — Mar. 28 107
Tool block improvements — June 6 151
Tripling production during cutoff — July 18 139
Hill, R.J. Bearings add length to undersize tools — July 18 140
Collet device positions work — June 6 152
Combination work support and soft vise jaws — July 4 106
Crank improves tapping small drill press — Aug. 1 118
Dowel pin jig for grinding — Sept. 26 135
Fast acting jig cuts finished bars — Mar. 14 160
Fastener locks out index pin — Mar. 28 107
Gage pin improves stop screw — Nov. 21 146
Holding headed pins in a V-block — May 9 138
'Third hand' for shaper work — Feb. 28 110
Workpiece counter for lathe — Feb. 14 105
Z-bar aids center punch — Apr. 11 252

I

Isetts, R. Car spring gives press strong grip on stock — Nov. 7 174
Gage checks three dimensions — Nov. 21 146
Ishihara, Yasumasa. NC grinder cuts auto cams — Sept. 26 112

J

Jackson, W.K. Red China aims at Afro-Asian market — Oct. 24 126
Jagen, R. Boring holes near an edge — Mar. 28 107
Centerdrill does double duty — Sept. 12 147
Cure for heat treat cracks — Feb. 14 106
Holes laid out on lathe — Jan. 17 139
Short cut method checks PD for special threads — Aug. 1 117

Tools lined up quickly in lathe — Mar. 14 159
Jones, E. Cutting internal grooves — Dec. 19 124
Expanding workholder — Sept. 26 135
Geared head motor drives countersink — Oct. 10 166
Making chamfered pins — July 4 105
Self-centering transfer punch — Aug. 29 92
Short cut method measures shaft rpm — Oct. 24 162
Tool to cut grooves for retaining rings — Dec. 5 164
Versatile heel block — Aug. 1 118
Josephs, H. Atomizer sprays layout dye — Sept. 12 148
Junk, T.C. Quality welds at low cost — June 20 134

K

Kagan, P. Inexpensive sine vise — Sept. 12 147
Making precision angle plates — Oct. 24 161
Modified taps yield near-perfect threads — Feb. 28 109
Katell, A. Chuck jaws renewed — Aug. 15 130
Keller, W. Precision spacing system for gang milling — Apr. 11 251
Killam, R. EDM electrode speeds cutting of deep slots — Nov. 7 174
Kimberling, D. Cleaning tank simplifies work handling — Apr. 25 115
Convex cutting on engine lathe — Jan. 31 86
Cutoff fixture — Sept. 26 136
Depth gage has level built into base — Mar. 28 108
Fixture holds thin work — Aug. 15 130
Keyway cutting on the engine lathe — May 23 141
Light bulb heats bearings — Aug. 29 92
Magnet shunts metal flakes — July 4 105
Reamer fixture saves time — June 20 156
Rubber inserts hold wire in cutters — Oct. 24 161
Shim build up — Oct. 10 166
Spring insures centering of telescoping stages — Dec. 19 123
T-slot nuts won't bind — Dec. 5 164
Kirschbaum, R.A. Tapping an 'impossible' steel — Nov. 21 107
Koslow, H. Caliper has many uses — Nov. 7 174
Centering a cutter — Oct. 10 166
Divider scribes small circles — Aug. 1 118
Numerical readout for cutoff saws — May 23 142
Parallel plate for lathe chuck — Dec. 5 164
Press tool rolls rings with urethane — Apr. 11 251
Slotting special screws — July 4 106
Threads cut on disk face — Aug. 15 130
Kudenov, W. Jr. Joining beryllium to stainless — Sept. 12 118
Kuletz, Joseph. Drilling by ear — July 4 63

L

LaBoda, M.A. & M.L. McMillan. ECM tailored for precision — Dec. 5 144
Labonack, C.J. Tooling a fourslide, 9 — May 9 108
Le Grand, Rupert. Diemakers build machines too — July 4 70
Faster way to contour mill — Mar. 28 72
How to select power squaring shears — May 23 117
Scheduling with a computer — Oct. 10 121
Steel die kit for short runs — Bennett die 300 cans a minute! — June 20 126
Lettino, F. Table top inspection mirror — Jan. 17 140
Lindberg, H.C. Oil cools drills at 750 psi — Apr. 25 101
Littlefield, L.L. & G.R. Stoeckinger. NC welder goes into action — Aug. 1 95
Lofton, Max. NC for stretch dies — Aug. 15 108
Tool support for heavy cuts — Sept. 26 136
Long, B. Jr. Rifler file made quickly — Jan. 3 94
Slitting cutter trimmed to cut odd-size slots — July 18 140
Solder wire is cut quickly — May 9 138
Lovdahl, R. How to handle 'trapped' screws — Feb. 14 106

M

McConnell, B.R. Sr. Manual stroke honing at work — Mar. 28 79
McCrary, Dan. Manpower around the world – England — Oct. 24 131
McFalls, R.D. & V.R. Munson. How to figure milling times — Jan. 3-69-84
McLaughlin, C. Container aids coolant flow — Sept. 26 136
Drill press setup speeds finishing — Aug. 29 91
Expanding-type mandrel — Aug. 15 129
Flexible fixture has a tight grip — Oct. 10 165
Indicating aid for lathe work — Apr. 11 252
Lathe mills square shanks — July 18 139
Press tool produces shaft with ring groove — Jan. 31 85
Setup to cut off and mill flat — Jan. 3 93
Shaper tool produces a divided collar — Feb. 28 109
Swinging die draws and pierces — Dec. 5 163
Tool for cutting deep slots — Dec. 19 123
Tool makes four bends in one stroke — July 4 105
McMillan, M.L. & M.A. LaBoda. ECM tailored for precision — Dec. 5 144
Menschine, Harry. Time recorders check on NC — July 18 109
Merrick, G. & others. Welding a tilted contour — Aug. 1 100
Mess, M.J. Press-brake bends — Nov. 7 167
Michels, Bernard. Tricks with tool attachments — Jan. 17 82
Mikton, J.R. East-West team up on NC lathe — May 23 109
Miller, H.J. Getting more rpm from small grinding wheels — June 20 155
Moore, W.R. Repeatability to 0.2 millionth! — Aug. 29 65
Mote, Harry. Hydraulic clamping simplified — Dec. 5 135
Retooling for nuclear power — Sept. 26 116
Retraining eases a phase-out — Aug. 15 104
Sharp ideas raise knife output — July 18 124
Three roads to reliability. 3. How about standards for standards? — Jan. 31 65
Mueller, Heinz E. Tolerances for balancing, 1 & 2 — Feb. 14 99
Munson, V.R. & R.D. McFalls. How to figure milling times — Jan. 3-69-84
Murro, H. Notched blanking die saves material — Jan. 3 93
Myers, Marilyn. Manpower around the world: France — Dec. 5 152

N

Nansen, R.H. & G.T. Albert. Milling boosts lunar payload — Feb. 28 71
Nelson, Gale R. How IBM presets NC tooling — Apr. 25 97
Norwood, R.A. & R.A. Reynolds. The versatile adaptive control — May 23 103

O

Oates, G. Pins grooved in a hurry — Jan. 17 140
Ogden, W.G. Jr. Advanced tooling for tool room lathe — May 23 141
Osborn, Max. Resistance welding of steel tubes, 1 Oct. 10-155-157, 2 — Oct. 24-155-157
Ormston, L.R. Why a measuring machine? — Sept. 26 122

P

Parker, C.M. Precoated steels — Sept.12-129-136
Parker, J. Bolt and stud remover — Jan. 3 93
Parker, T.D. & J.Z. Briggs. How to work the super 12% Cr steels — Mar. 14-139-150
Parmley, R. Curl groove aids cutoff — May 9 138
Slide strap clamp with steel balls — June 6 152
Perry, Wes. Manpower around the world – Brazil — June 20 142
Phillip, R. Adjustable boring bar — July 4 105
Center rest holds hexagonal bars — Nov. 7 174
Chart shows pressure for press working — Dec. 19 123
Compound feed geared down — Jan. 3 94
Drill guide for lathe — Oct. 24 161
Drilling holes in angle iron — Aug. 1 118
Fast fixture for long runs — Sept. 12 148
Finger triggers end of feed on tool room shaper — July 18 140
Lathe cuts internal grooves with offset boring head — June 20 155
One step punching and forming — May 23 141
Punch press handles oversize blanks — Aug. 15 130
Seven operations handled on six-station turret lathe — Sept. 26 135
Simple lapping tool — Jan. 31 86
Spring assists tailstock moves — May 9 137
Stripper speeds press setup — Mar. 28 108
Tool holder for heavy cuts — Feb. 14 105
Work supported during cut-off — Apr. 11 252
Pippi, A. Cap screw fits misaligned holes — Feb. 28 110
Cut-away steel scale — Apr. 11 252
Emergency T-slot bolt — Dec. 19 124
Hand deburring tool — Oct. 10 166
Jaws extend vise capacity — Jan. 3 94
Multiple size adapter for slotting saw work — June 6 152
Novel support speeds sawing of large metal panels — Jan. 17 140
Quick pointers on tooling Aug. 1-117, Aug. 29-91, — Sept. 12 147

R

Ramsden, W.E. Work centers tackle big jobs — July 18 106
Ranill, J. & G. DeGroat. Snakeye production – keeping the Snakeyes rolling — Aug. 1 108
Raphael, Julian J. Steel-rule dies, 1 & 2 — Jan. 3 87
Rausch, Howard. Reds eye world tool market — Dec. 5 130
Reid, Marvin. 'Copters – rush! — Feb. 14 80
Helicopters in a hurry — Dec. 19 94
Reynolds, R.A. & R.A. Norwood. The versatile adaptive control — May 23 103
Rhein, Rex. Danger – laser — June 20 119
Rich, E.A. Pulsing coolant speeds drilling — Apr. 25 86
Richardson, Frank. Custom-built, cut-to-length line — Jan. 31 69
Ridgway, Fran. Nesting drums hatch savings — Aug. 15 115
Riker, R. Arbor support beefs up small, vertical mill — Oct. 10 165
Risch, R.P. Getting started with NC: installation — Nov. 7 158
Robertson, P.R. & William Dubusker. Fingertips move weld fixtures — May 9 97
Rosenbery, Joe. Spraying metal by electric arc — Jan. 31 66
Rowland, D. Scale holder aids cutoff — Feb. 28 110
Spring clamps hold work in welding fixture — Apr. 25 116
Tapping attachment fits drill press spindle — Oct. 24 162
Rush, F.L. Angle iron supports work — Sept. 12 148
Clamp block aids work setup — June 20 156
Hand reaming jig — June 6 151
Handle for index heads — Feb. 14 106
Handy deburring tool made from old drill — Mar. 14 160
Low-cost welding gage — Nov. 21 146
Punch aligning method — Nov. 7 173
Split nut protects threads in second operation setup — July 18 139
Spring and collar assists reaming — Dec. 19 124
Tongued plate holds level for shaft positioning — Jan. 17 140
Tool holder for shaper — Jan. 31 86
Washer workpieces split on special mandrel — Apr. 25 115

S

Sandford, James E. Cleaning with ultrasonics — Feb. 14-87-90
Cutting with a spark — July 4-77-92
Fast polish for stainless sheet — July 18 130
Fine grinding of huge plates — Mar. 28 86
Gold plating costs come down — Jan. 3 62
Line jumps piston output 50% — Jan. 17 84
Low-cost NC contouring — Apr. 25 83
NC is management's baby — Sept. 26 106
Plated nickel shapes up — Oct. 10 125
Putting accuracy into EDM — Nov. 7 141
Shop laser checks NC positioning accuracy — Nov. 21 110
Specials 'built' by computer — Sept. 12 115
Schaefer, J.M. A computer picks a machine — Aug. 1 93
Schmidt, J. Air moves heavy tailstock — Jan. 31 86
All-around drill jig — June 20 155
Arbor saves setup time — Sept. 12 148
Center lines drawn quickly — Sept. 26 136
Center punch for accurate work — Dec. 5 163
Cutting thin disks in a lathe — June 6 152
Driver for gib keys — Oct. 24 162
Fixture aids drilling — Mar. 28 108
Press curbs offset loads — Oct. 10 166
Screws expand in blind holes — May 23 141
Tool bends precise angles — Jan. 17 139
Turning eccentric parts — Nov. 7 173
Turning long, hollow cylindrical shapes — July 18 140
Schneider, Edward P. Wing bending methods — June 6 143
Sciaky, A.M. Call it 'adaptive spotwelding' — Dec. 19 85
Scott, David. Red Bloc machine tools at Leipzig — Apr. 11 132
Scott, Richard B. Regenerative shop planning — Mar. 28-89-94
Soderstrom, H.R. Practical use of machinability data — May 9 129
Spinks, H. Tap becomes thread chaser — Jan. 3 94
Squires, Howard A. How to machine a giant — Mar. 14 132
Star, Jack. Auto dies by computer — Nov. 21 112
Manpower around the world: Italy — Sept. 12 126
Stoeckinger, G.R. & L.L. Littlefield. NC welder goes into action — Aug. 1 95
Stolle, H. Spring loaded center saves time — Jan. 31 85
Strasser, Federico. Blanking strip with gages — Feb. 14 76
Locking-type indexing fingers (Ref. Bk. Sheets) 1. Nov. 21-139, 2. Dec. 5-157, 3. — Dec. 19 119
Suffredini, R.L. A guide to heat treating — July 18 111

T

Teshy, D. Cutting odd-size gaskets — Feb. 14 106
Thomas, Fred. Multiple-wheel internal grinding (Ref. Bk. Sheet) — Sept. 26 127

Treff, C.C. NC cuts short-run 'stampings' — Aug. 15 101
Trigger, K.J. How heat affects tool wear — July 18 101
Troup, G.B. Machinability tests: a critique — Apr. 11 127
Tyson, S.E. A new look at stainless — May 9-115-126

V

Van Parys, H. Getting started with NC: Selection — Nov. 7 155
Vena, A. Electrical wire used as copper welding material — July 4 106
Salvaging a welding rod — Feb. 14 106
Valves are self-indicating — Dec. 19 124
Visconi, George. Short run hobbing on a rotary — July 4 66

W

Wallace, A. Extension holder for taps — Nov. 21 146
Waller, J.A. Boring bar made from steam tube — Aug. 1 117
Chuck supports tailstock — Mar. 14 159
Holding down a machine tool — Dec. 5 163
Machining a large spherical bore — June 20 155
Press bends scratch-free parts — Feb. 14 105
Spring loaded boring tool absorbs cutting shocks — Aug. 29 91
Tapering special screwdriver blades — Sept. 26 135
Turret lathe tool cuts V-grooves — Nov. 21 145
Walsh, G.T. Skiving on automatics — Feb. 28 88
Wheeler, R. Disk for hand tapping — Aug. 29 92
Williams, George. Going to mechanized soldering and brazing? — Aug. 1 89
Winston, Don. USSR faces a surplus of unskilled labor — Mar. 14 126

Y

Yost, V.G. Carbide-tool breakage — Apr. 25 107

Z

Zagar, Frank. 'So we switched to the decimal inch...' — Nov. 7 140
Zimmerman, Art. A new twist in helicopter blades — Jan. 3 60
Zlatin, Norman. Needed: reliable machinability data — Sept. 26 109